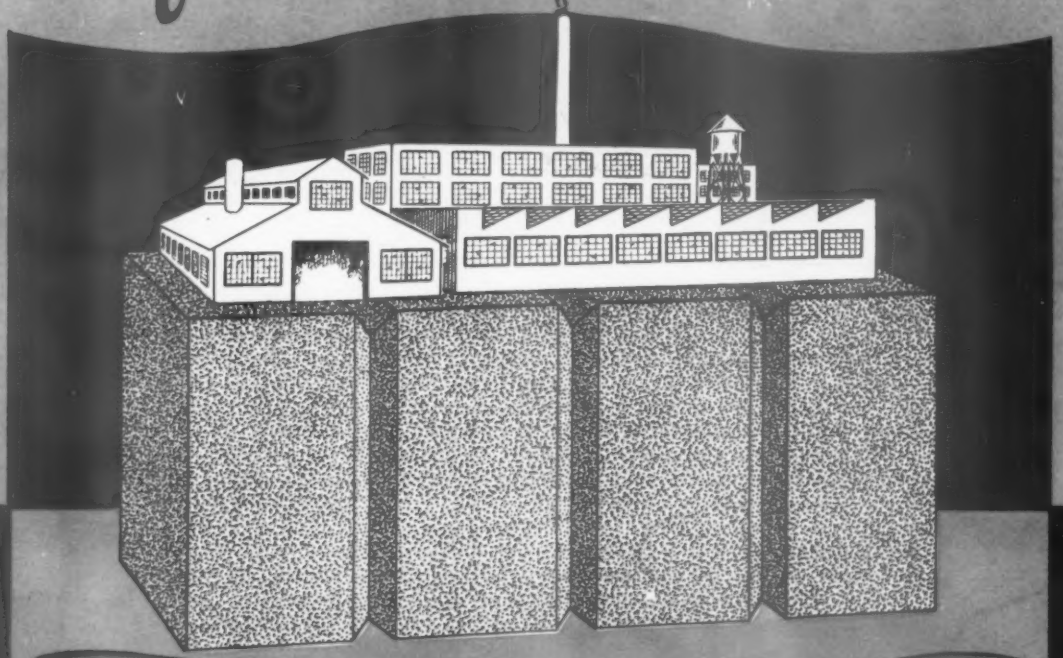
October, 1948

THE FOUNDRY

wherever metals are cast...

A "deep" foundation for better castings



CLEANSES MOLTEN IRON. CASTINGS ARE STRONGER, EASIER TO MACHINE

FAMOUS CORNELL FLUXES
Trade Mark Registered

The CLEVELAND FLUX Company
1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

Famous CORNELL CUPOLA FLUX in SCORED BRICK FORM

Floated down inland waterways from Connellsville, Pa., two home-made river boats docked at Cincinnati in 1842, carrying cargos of the first commercial beehive coke.

LOSS CARGO IN 1842!

. . . *Connellsville coke reflects changes in iron industry*

PURITE is commercially pure soda ash containing over 98% sodium carbonate, fused and cast into convenient 2-lb. pigs. Its desulfurizing and refining action are traceable to the chemistry of soda ash.

Selling two boatloads of the first "beehive" coke was a losing deal in 1842. Produced on Taylor's Farm in Fayette County, Pa., some of the Connellsville coke went to foundrymen for 8 cents a bushel; the rest was traded for the equivalent of only $30.

Yet beehive coke grew enormously in favor, finally replacing both charcoal and anthracite as iron furnace fuel. Coke usage in 1946—principally by-product coke, which replaced beehive oven coke after 1893—ran close to 3 million tons in foundries . . . over 50 million tons for the entire iron and steel industry.

Along with the use of better fuels, there have been important changes in cupola melting practice—the development of PURITE, for example. It improves melting conditions within the cupola, and fluxes the molten metal of entrained impurities.

Producing a fluid slag higher in the melting zone, PURITE keeps the coke surface cleaner, resulting in hotter melting, with less oxidation of metal. PURITE, in addition, forms a more highly basic slag which washes out sulfur, gases and entrained oxide-slag inclusions, giving a clean, fluid iron.

Ask for pamphlet: "Purite—The Scientific Flux." Write Mathieson Chemical Corporation, 60 E. 42nd St., New York 17, N.Y.

Mathieson

PURITE

Purite (Fused Soda Ash) . . . Liquid Chlorine
Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua
Sodium Chlorite Products . . . Chlorine Dioxide
HTH Products . . . Dry Ice . . . Carbonic Gas
Sodium Methylate

Omega chisels hold a cutting edge

Omega is primarily a tough, shock-resisting tool steel, but its normal working hardness at the cutting edge ranges from 58 to 60 Rockwell C. That's plenty hard enough to keep that cutting edge sharp for biting into the tough hides of rough castings.

Omega is the old reliable of chisel steels, combining just the right amount of shock-resistance with hardness and ductility. It's engineered for pneumatic chisels, core breakers, and other shock tools for severe cold-battering service. Shanks are tough and non-peening.

This fine-quality tool steel is easy to forge, re-dress, and heat-treat. Harden it in either oil or water.

Whether you make up your own chisels or buy them finished, you'll like the way Omega stays on the job longer . . . cutting more metal faster. Give it a trial and you'll see what we mean.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

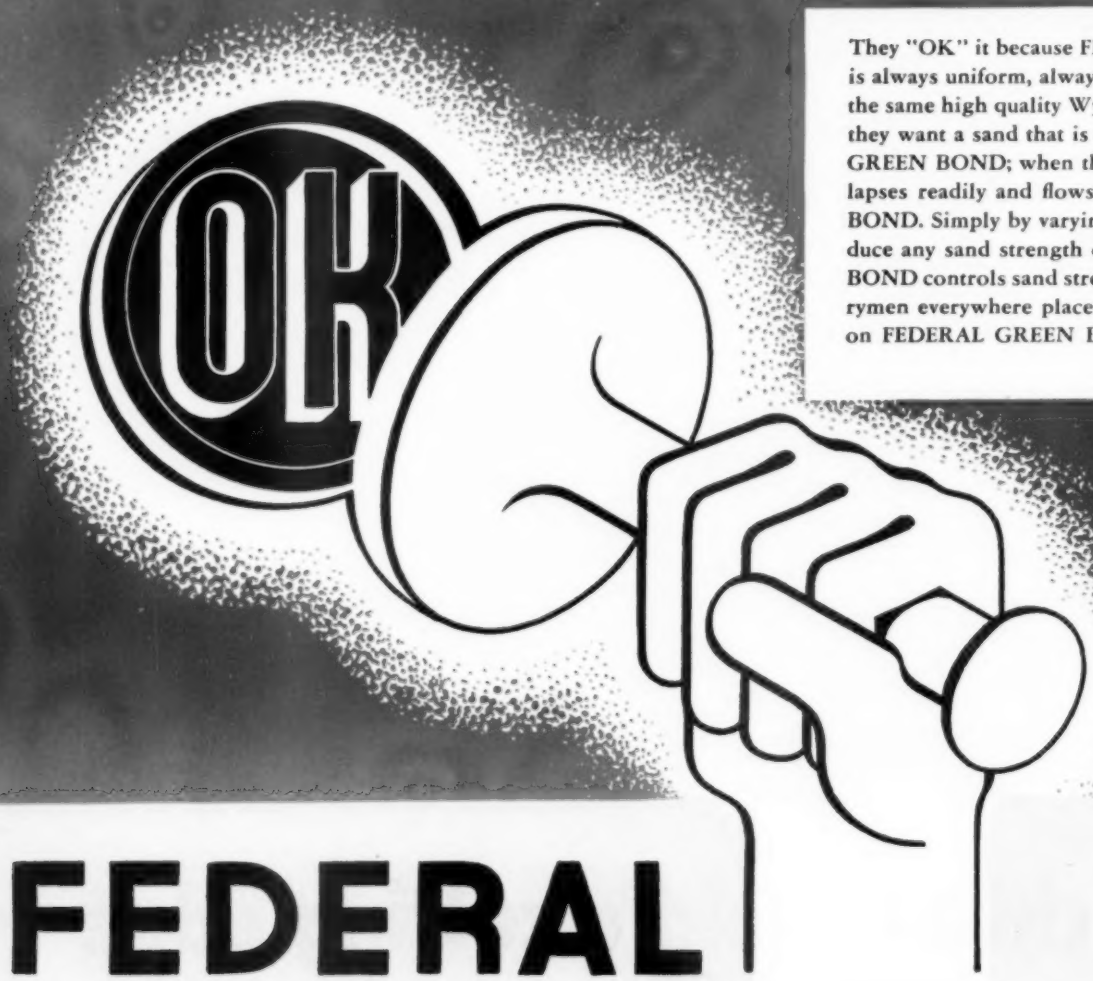
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

OMEGA . . . one of Bethlehem's Fine Tool Steels

Foundrymen everywhere place their stamp of approval on FEDERAL GREEN BOND

They "OK" it because FEDERAL GREEN BOND is always uniform, always dependable and always the same high quality Wyoming Bentonite. When they want a sand that is firm and stable, they use GREEN BOND; when they want a sand that collapses readily and flows freely, they use GREEN BOND. Simply by varying the mix, they can produce any sand strength desired, because GREEN BOND controls sand strength. This is why foundrymen everywhere place their stamp of approval on FEDERAL GREEN BOND.



FEDERAL GREEN BOND

The Best of the Wyoming Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant — Mines

CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • UPTON, WYO

The Foundry Supply Co., Inc., 404 So. Third St., Minneapolis 15, Minn. • Beaumont Cement Sales Co., Houston and Beaumont, Texas, and Harvey, La. • Chamberlain Company, Los Angeles, Calif. • Pacific Graphite Works, Oakland, Calif. • LaGrand Industrial Supply Co., Portland, Ore.
CANADA—Overseas Commodities Ltd., 2845 Grandview Hgy., Vancouver, B.C. • T. D. Barnes, 59 Sun Life Bldg., Hamilton, Ont. • Newman Foundry Supply, Ltd., 643 St. Paul St. W., Montreal, Que.
European Concessionaires: The District Chemical Company, Ltd., 1-19 New Oxford St., London W. C. 1, England

OCTOBER, 1948

THE FOUNDRY

VOLUME 76—NUMBER 10

EDITORIAL STAFF

FRANK G. STEINEBACH
Editor

WILLIAM G. GUDE
Managing Editor

EDWIN BREMER
Metallurgical Editor

PAT DWYER
Engineering Editor

DON S. CADOT
Art Editor

VIRGINIA C. TAYLOR
Assistant Editor

ROBERT H. HERRMANN
Assistant Editor

New York ..... B. K. PRICE
L. E. BROWNE
Chicago ..... E. F. ROSS
Detroit ..... A. H. ALLEN
Pittsburgh ..... J. C. SULLIVAN
Washington ..... E. C. KREUTZBERG
London ..... VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON
JOHN HOWE HALL
ALBERT E. GROVER
HARRY A. SCHWARTZ

BUSINESS STAFF

J. M. LATHROP
Advertising Manager

New York ..... J. F. AHRENS
Chicago ..... G. A. POPE
A. W. JOHANSEN
Cleveland ..... A. L. KLINGEMAN
Los Angeles ..... F. J. FULLER

Circulation and Research

J. W. ZUBER, *Director*
R. L. HARTFORD, *Market Research*
HELEN KENNEDY, *Subscriptions*

Production Department

A. V. ANDERSON, *Manager*
W. J. STAAB, *Assistant Manager*

Main Office

Penton Building, Cleveland 13, Ohio

Branch Offices

New York, 17 ..... 16 East 43rd St.
Murray Hill 2-2581
Chicago, 11 ..... 520 N. Michigan Ave.
Whitehall 4-1234
Detroit, 2 ..... 6560 Cass Ave.
Madison 3024
Los Angeles, 4 ..... 130 N. New Hampshire Ave.
Fairfax 1758
Pittsburgh, 19 ..... 2806 Koppers Building
Atlantic 3211
Washington, 4 ..... National Press Building
Executive 6849
London ..... 2 Caxton St.
Westminster, S.W. 1

THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and General Manager; RUSSELL C. JAENKE, Vice President; FRANK G. STEINEBACH, Vice President and Secretary, and EDITH L. WERNER, Assistant Treasurer.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years, $5. Other foreign countries, $6. Single copies 35 cents. Copies published three months or more previous to date of current issue, 50 cents.

Member: Audit Bureau of Circulations, Associated Business Papers, National Publishers Association. Copyright 1948 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland under act of March 3, 1879.

Editorial 67

Gating Systems for Metal Casting 68
By WILLIAM H. JOHNSON and WILLIAM O. BAKER

Aluminum Alloy Castings (Part XI) 74
By FLOYD A. LEWIS

Comparative Strength and Hardness of Core Binders 76
By HIRAM BROWN

Modernizes Sheave Foundry 80
By PAUL C. VOGEL

Permanent Mold Gray Iron Castings by the Million 82
By ARTHUR H. ALLEN

Centrifugal Castings of Steel (Part III) 88
By JOHN HOWE HALL

Incentives in the National Economy 92
By J. W. NICKERSON

Combined Method for Spectrophotometric Analysis of Gray Iron 93
By G. T. HENDERSON

Friction Cutting Gates and Risers by the Band Saw Method 94
By H. J. CHAMBERLAND

Adjusting Iron Composition by Addition of Ferroalloy Briquets 115
By JOHN N. LUDWIG Jr.

Pulverized Vermiculite Has Foundry Applications 116
By TONY WILLCOX

How to Reinforce a Fragile Pattern 118
By JOHN R. NICHOLS

Around Detroit 120
By ARTHUR H. ALLEN

Precision Molding Process Employs Resin Binder 130
By WILLIAM W. McCULLOUGH

Man-to-Man on the Molder's Bench 136
By RALPH L. LEE

New Swedish Metal Research Institute Opened 142
By ERIK O. LISSELL

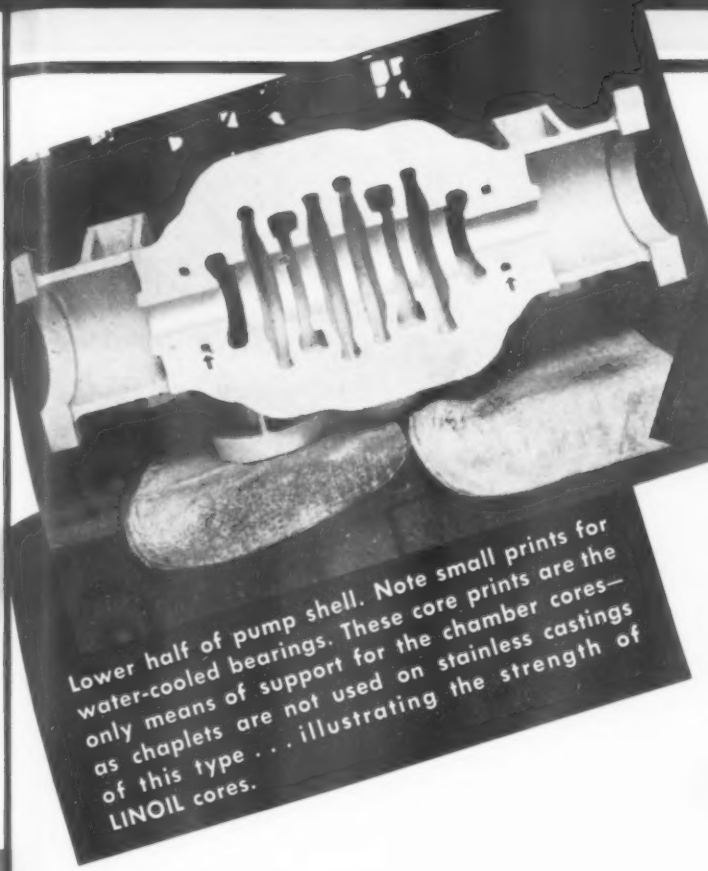
The Adventures of Bill 200
By PAT DWYER

Flexible Molds for Low-Melt Alloys 218
By THOMAS A. DICKINSON

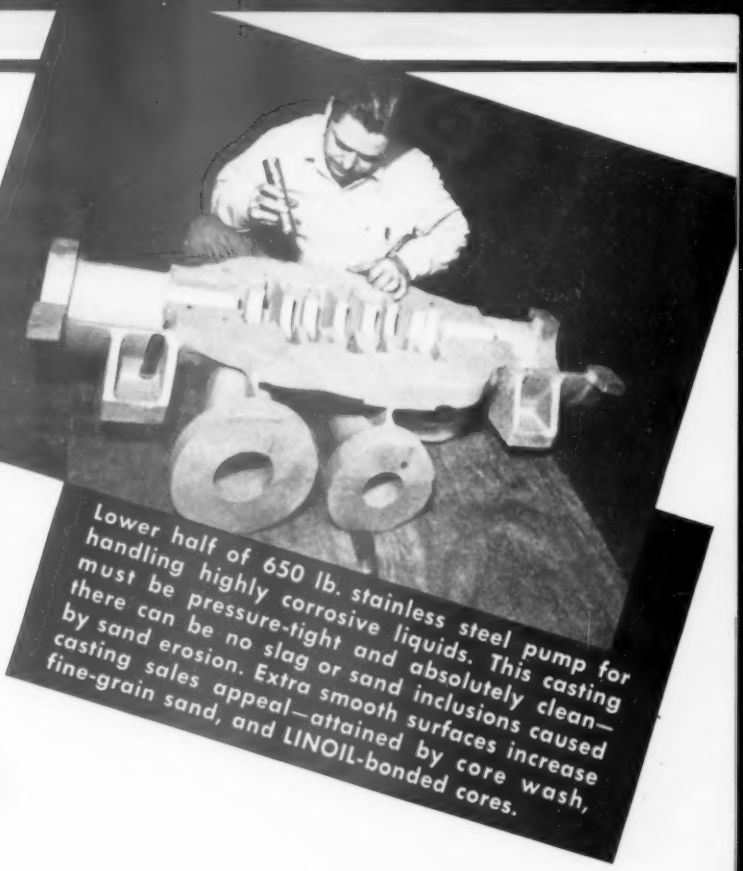
Questions and Answers	98	Obituary	213
Men of Industry	104	Industry Briefs	248
Foundry Data Sheet	125	New Equipment and Supplies	254
Foundry Developments	128	Trade Publications	270
Foundry Group Activities	148	Helpful Literature	287
Meeting Calendar	168	Where-to-Buy Directory	297
Foundry Statistics	178	Advertisers Index	317

LINOIL CORES RESIST PENETRATION... RETAIN COLLAPSIBILITY...IN MULTI-STAGE, STAINLESS STEEL PUMP

MICHIGAN STEEL CASTING COMPANY
DETROIT, MICHIGAN



Lower half of pump shell. Note small prints for water-cooled bearings. These core prints are the only means of support for the chamber cores—as chaplets are not used on stainless castings of this type . . . illustrating the strength of LINOIL cores.



Lower half of 650 lb. stainless steel pump for handling highly corrosive liquids. This casting must be pressure-tight and absolutely clean—there can be no slag or sand inclusions caused by sand erosion. Extra smooth surfaces increase casting sales appeal—attained by core wash, fine-grain sand, and LINOIL-bonded cores.

In specialized, highly skilled stainless steel castings . . . core problems mount as the pouring temperature rises. At heats of 2900° and 3000°, resistance to metal erosion and penetration become absolutely essential to proper core performance. Usually casting design is so intricate that quick collapsibility can not be neglected in favor of core hardness.

LINOIL cores bake quickly . . . through to the very centers . . . have minimum gas content . . . maximum baked tensile strength. Experience has proven that LINOIL cores — hard as brick-bats — resist penetration at 3000° . . . yet collapse readily to avoid shrinkage cracks . . . then shake out like dry sugar for lowest possible cleaning costs.

Here at Michigan Steel Casting Company . . . LINOIL'S top quality and laboratory-controlled uniformity assure the dependable performance of each core — maintaining uninterrupted production of highly specialized castings at low cost.

Checking one of the 18 cores that make up the lower half of this multi-stage, double suction pump.

Arrows point to chamber cores for water-cooled bearings—these cores must retain perfect accuracy under a very thick wall of metal.

THE LINOIL — THE LOGICAL OIL

WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET · CLEVELAND 2, OHIO

2 NEW ROTOBLASTS*

1 Pangborn ROTOBLAST "TABLE-ROOM"

for all general-purpose blast cleaning jobs

With the new ROTOBLAST "Table-Room" the jobbing foundry can overcome conventional cleaning handicaps and blast clean castings as thoroughly, almost as economically, as the specialty foundry. The Pangborn "Table-Room" is your best selection for a single blast machine for all types of general-purpose blast cleaning work.

From small castings of any shape, up to heavy castings of 5000 lbs., five feet long, thirty inches high, the Pangborn ROTOBLAST "Table-Room" cleans *faster, better, cheaper.*

You don't need an experienced operator, compressed air, helmets, hoses or nozzles! The "Table-Room" takes the operator out of the blast room. All your operator has to do is put the castings on the table, close the doors, turn on the ROTOBLAST. Within a few minutes, work is cleaned down to virgin metal.

*Trademark of the Pangborn Corporation

Pangborn "Table-Room" Users Include:

- Allied Industrial Sand Blasting
- Caldwell Foundry
- California Foundries
- Champion Blower & Forge
- Clare Bros. & Co.
- Contractors Foundry
- Elliott Co.
- General Foundries
- L. Brayton Foundry
- Lewistown Foundry & Machine Co.
- Minster Machine Co.
- Snapp Foundry Co.
- Thunder Bay Mfg. Corp.
- Valley Iron Works
- Western Brass & Iron Foundry
- Westinghouse Electric Corp.

ABOVE: "Table-Room" during operation
LEFT: Doors open for loading

Pangborn

Take Operators Out of Blast Rooms

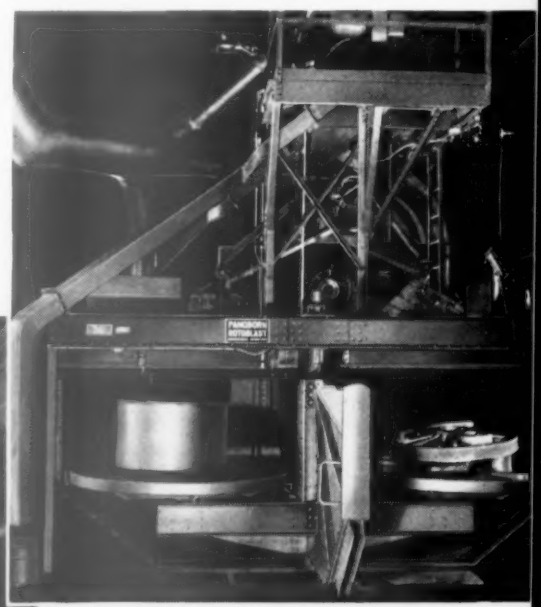
2 Pangborn ROTOBLAST "TURN-STYLE" Table

for rapid, economical cleaning of heavy castings

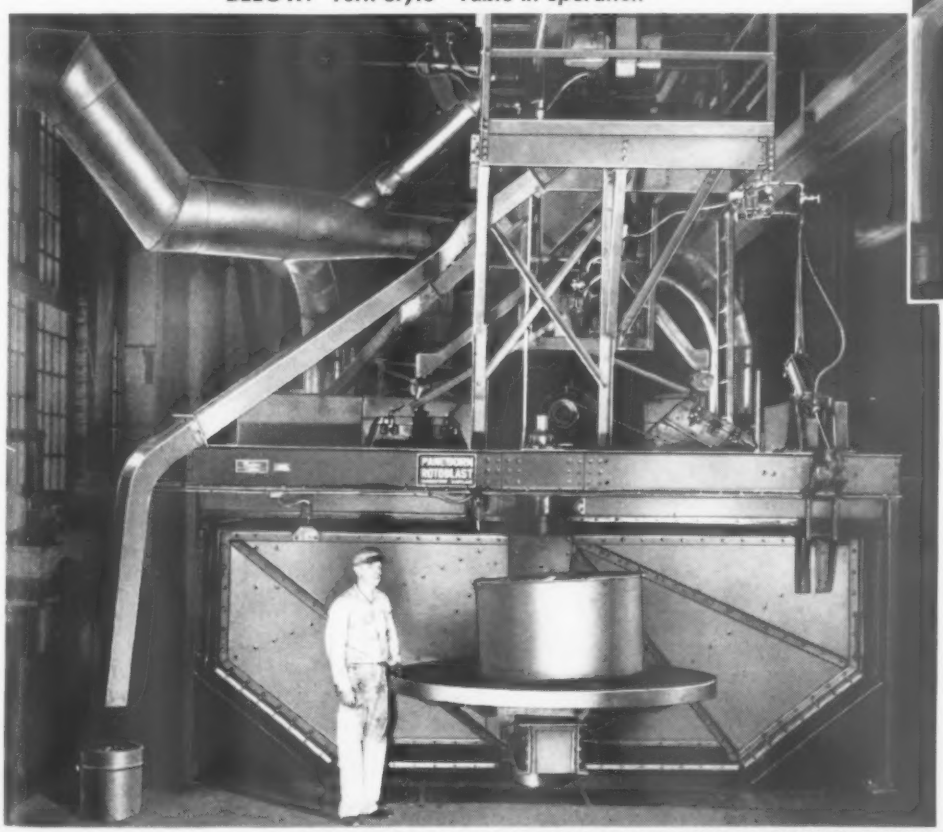
Here is Pangborn's answer to the problem of cleaning heavy, bulky castings quickly, efficiently. The Pangborn "Turn-Style" Table cleans and loads simultaneously, as one of the cleaning platforms is always inside the cabinet while the other is in loading or unloading position. The operator is always free to load, unload and turn the tables . . . he's not burdened by protective clothing or confined in the blast chamber.

Prominent users of the Pangborn ROTO-BLAST "Turn-Style" Table include General Electric, Skagit Iron and Steel Company, and Penn Steel Castings Company (where it cut a two man, eight-hour anchor cleaning job to *15 minutes with one man*). The "Turn-Style" Table is an ideal choice if you're cleaning heavy castings and want top efficiency and speed.

RIGHT: Tables half turned



BELOW: "Turn-Style" Table in operation



WRITE TODAY!

Write for complete information about Pangborn ROTO-BLAST Tables contained in the illustrated, informative Pangborn Bulletins 215 & 217. Address: PANG-BORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control.

OVER 25,000 PANGBORN MACHINES SERVING INDUSTRY

BLAST CLEANS CHEAPER

with the right equipment for every job

"Control Over Quality And Costs Paramount"

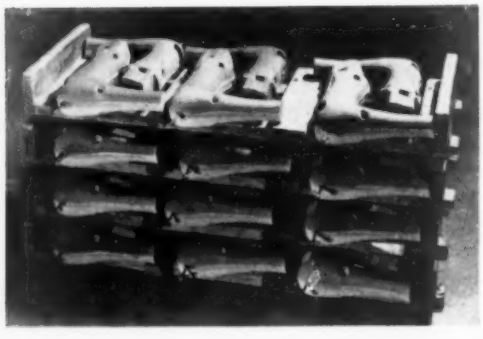
THE FOUNDRY — WHEREVER METALS ARE CAST

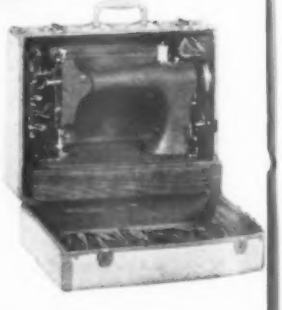
—MAKES IT WORTH WHILE TO

"Champion

YOUR FOUNDRY

You take a long step forward toward quality and cost control when you equip with Champion Core Blowers and Molding Machines. Foundrymen of long experience designed and built these machines on the basis of a sound knowledge of what it takes to produce high quality castings at a profit. That's why you'll find Champion equipment at work in the leading foundries such as those represented in this advertisement.

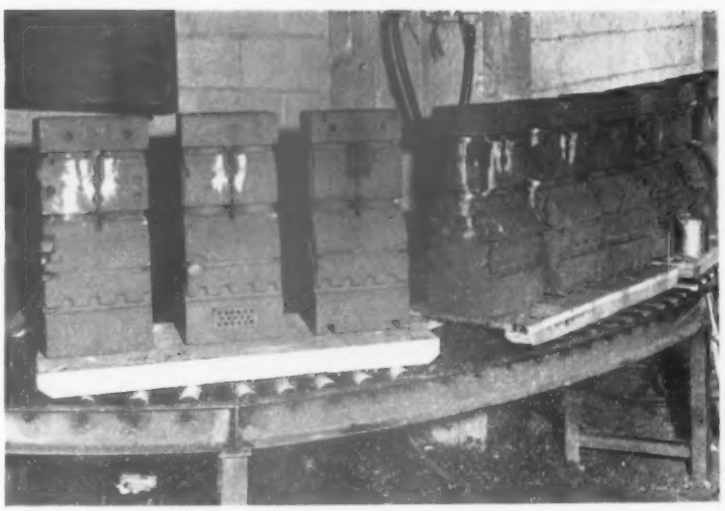




Champion CB12 Core Blower, at National Sewing Machine Company, Belvidere, Illinois, blows cores for this late model portable electric sewing machine. "They do a first class job, FAST."

Champion CB18 Core Blower at Oliver Farm Equipment Company's foundry at Charles City, Iowa. Six similar sections blown on this machine form the core of a six cylinder gasoline engine casting, used in the power plant of the latest type farm tractor.

ize"



From the newest, smallest model, the "Junior" Champion, up to the mammoth CB400, every Champion Core Blower possesses the same distinctive features, the same unique blow valve, which assure a perfect core every time, in a fraction of a second, with the standard air pressure of 85 pounds.

Operation is safe, simple, speedy! There's a size and type for every job. Talk with us about your core requirements . . . you'll find it pays!

Champion Molding Machines, Jolt Squeezers and Roll-Overs are performing in true Champion-ship form at leading foundries in this country and abroad. Champion production specialists are always glad to consult with you in regard to improving your production standards.

CHAMPION FOUNDRY & MACHINE CO.

GENERAL OFFICE AND PLANT, ROCKFORD, ILLINOIS

SALES OFFICE: 1553 W. MADISON ST., CHICAGO 7, ILL.

MOLDING MACHINES CORE BLOWERS

ELECTRIC RIDDLES

MOLTEN METAL *CAN'T* HURT 'EM!

NON-BURN NON-WARP SLIP JACKETS

ARE NOT AFFECTED BY RUNOUTS or SPILL-OVERS

CMD Slip Jackets won't stick; they fit smoothly and strip *clean* from the mold.

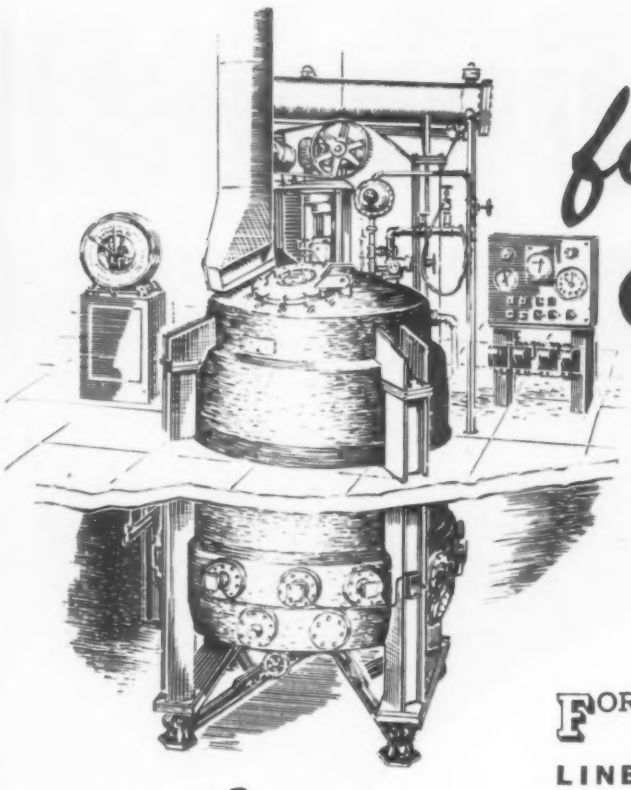
Heavy corner irons 2″ x 2″ x ⅛″ and cross reinforcing irons 1″ x 1″ x ⅛″ bolted and arc-welded in place prevent warping.

Write Today for Descriptive Circular!

On jackets up to 8″ deep, SINGLE angle irons are used.
On jackets over 8″ deep, DOUBLE angle irons are used.

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. F, 1928 West 46th Street — Chicago 9, Illinois



for Quality

CORE BINDERS

it's

UNITED

LINBOND

KORBOND

AQUA-BOND

KORGLAZE

TOP-BOND

AQUA-SET

FORTY YEARS of service to industry and the foundry trade have developed . . .

LINBOND . . .
A core binder of top quality for the toughest jobs core rooms encounter—a clean strong oil.

KORBOND . . .
An all around binder. Bakes out over a wide range for time and temperature in the oven.

AQUA-BOND . . .
An emulsified binder for cores that must collapse fast. It has a low gas content.

KORGLAZE . . .
A vehicle for use with graphite in coating cores to prevent metal penetration.

TOP-BOND . . .
A spray for Green Sand Cores and Moulds. Will process surface to a firm hard condition.

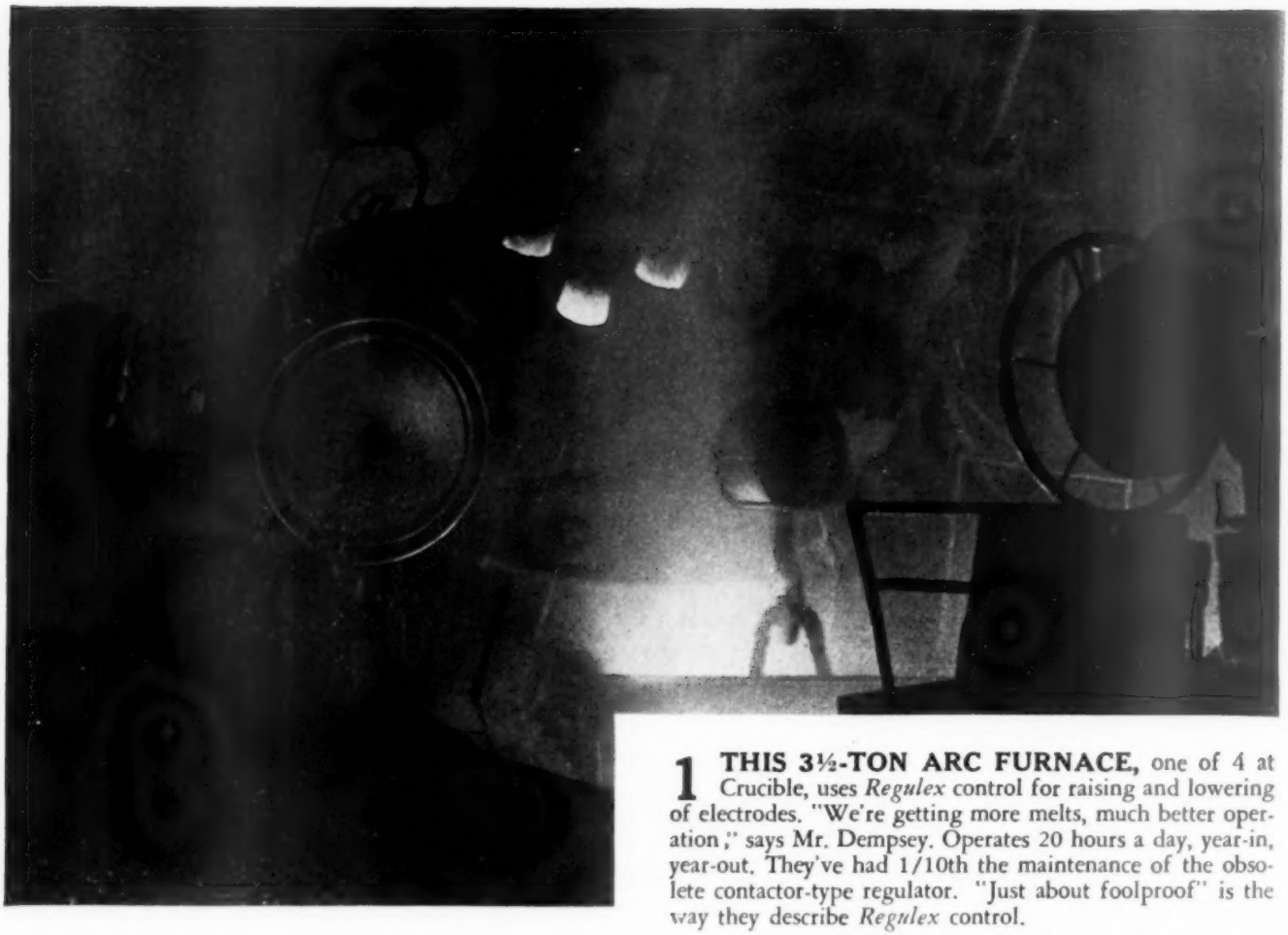
AQUA-SET . . .
A synthetic resin type of binder which bakes fast at low temperatures. A *must* for magnesium foundries.

Write us today
for complete information on
Quality Core Binders

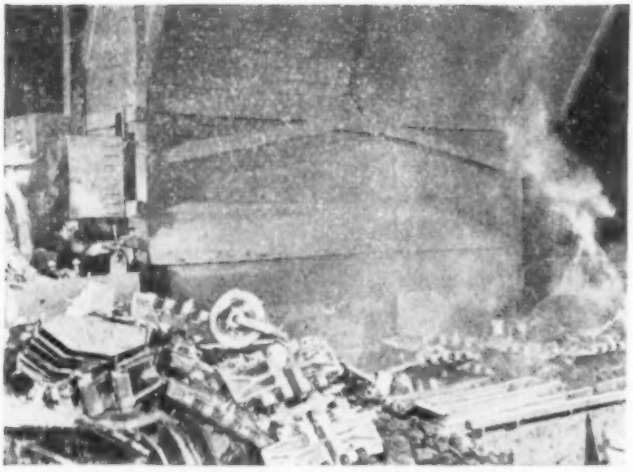
UNITED OIL MFG. CO.

1429 Walnut Street · ERIE, PA.

"A-C Equipment



1 THIS 3½-TON ARC FURNACE, one of 4 at Crucible, uses *Regulex* control for raising and lowering of electrodes. "We're getting more melts, much better operation," says Mr. Dempsey. Operates 20 hours a day, year-in, year-out. They've had 1/10th the maintenance of the obsolete contactor-type regulator. "Just about foolproof" is the way they describe *Regulex* control.



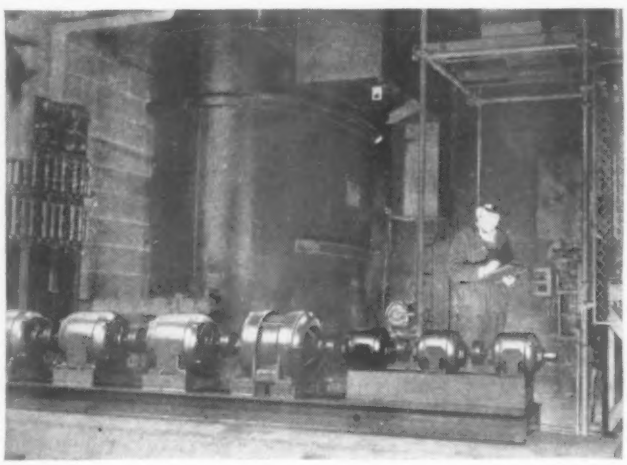
4 "A-C" DOESN'T MEAN ONLY ELECTRICAL! This huge dual-drive 8 by 10 foot Allis-Chalmers shakeout has been operating 18 hours a day since 1943; shakes out up to 2200 lb. rough steel castings. Average output is 90-100 tons for 8 hour day, though they can go considerably higher if necessary. Drives are "A-C" too — two 15 hp, totally-enclosed motors and *Texrope* drives!

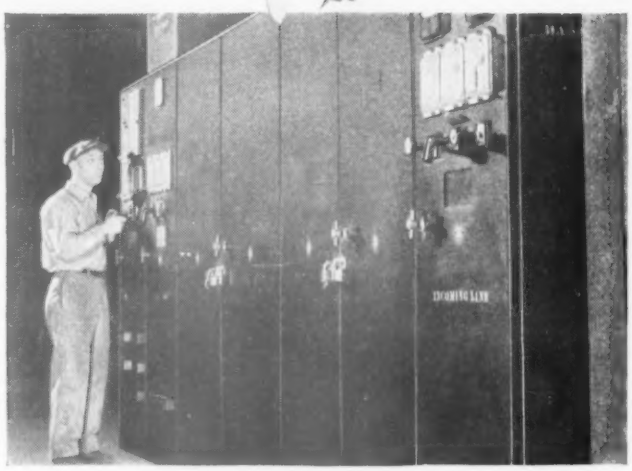
5 30 TO 60 TONS of broken core sand goes over this *Low-Head* vibrating screen each day. It's designed to operate horizontally, saving both headroom and space. All welded parts are stress-relieved for added strength; and vibrating mechanism imparts uniform vibratory motion to the screen body. Crucible's policy, as Mr. Dempsey has put it, is to "Keep ahead" . . . and they sure practice it!

Stands Up!"

—Mr. A. Dempsey, Gen. Mgr. Crucible Steel Castings, Milwaukee

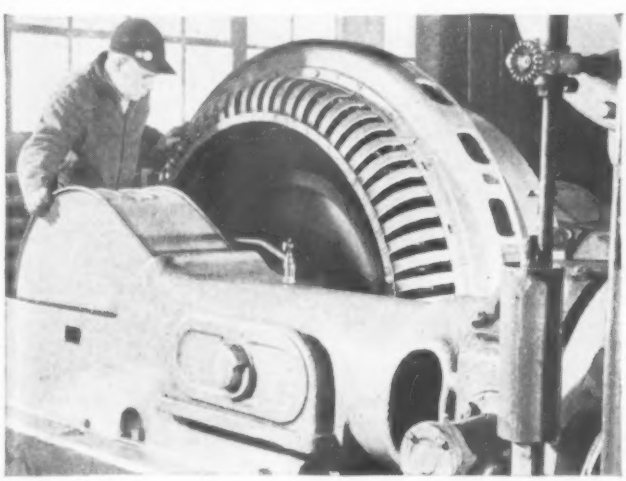
Crucible Steel is one of the Most Highly Mechanized Steel Foundries in the Middle West — with a Capacity of 2000 tons per Month, Castings from 1 Pound to 10 Tons. And they're Not Stopping there! Read below how Modern, Mechanized Equipment of the kind Allis-Chalmers Builds, Keeps Crucible Ahead in Foundry Production!





2 IN ADDITION TO *REGULEX* CONTROL for this furnace, Crucible has 4 A-C furnace transformers, 3 complete, solenoid-operated A-C oil circuit breakers for arc furnaces alone! Here's "Casey" Michalak, Chief Electrician, looking over a 2500 kva furnace transformer, switchboard, *Regulex* control, 15 kv oil circuit breaker and current transformers — all Allis-Chalmers!

3 LOCATED RIGHT AT LOAD CENTER, this 13,200 volt unit-substation distributes to power and lighting transformers. "Casey" says biggest enemy of electrical equipment is dust; uses time-table maintenance as a solution. Any continuously-running equipment looked at once a day; crane motors once a week. Transformer oil test every 3 months. Every 2 weeks breakers checked.



6 IT PAYS TO DEAL WITH THE COMPANY that builds a wide line of quality equipment! Other examples at Crucible are this 210 hp synchronous motor for air compressor; an m-g set; and an "A-C" booster pump in their dust control system. Yes, it pays to buy the equipment that pays for itself . . . for in foundries, as in every industry, "A-C equipment stands up!"

* * * * *

An experienced Allis-Chalmers representative will be glad to go over your foundry requirements with you. Consult your nearby A-C district office, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2484

Regulex, Texrope and Low-Head are Allis-Chalmers Trademarks

For Bigger Output . . . Better Working Conditions . . . Mechanize with

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment — Biggest of All in Range of Industrial Products

maintained **ALL DAY**
with **ORTON**

ONE-MAN

AERO-CRANE

POWERMATIC AIR-CONTROL

No Afternoon Fatigue Let-Down

One Man, with the Powermatic Air-Control Orton Aero-Crane loads and unloads cars, trucks, gets material onto the stockpile and off with *early-morning* efficiency *all day.*

Effortless Orton air-control enables one man with the Aero-Crane to handle 200 to 1000 lb. loads that eat up the time of a yard crew. Aero-Crane pays for itself in saved man hours.

Designed to SPEED Yard Work

Orton one-man Aero-Crane travels rapidly job to job with boom in any position.

Insures SAFE lowering of heavy loads against *compression of the engine.*

Full-view cab. Full circle turntable. Anti-friction bearings. Non-burn Orcoin V-type clutches. SAFETY spring-applied, air-released hoist brakes. Electro-welded construction.

Eight models, 3,500 to 60,000 lbs. capacity. Diesel or gasoline powered.

Send for Catalog 73-B for full details and roster of Orton world-wide users

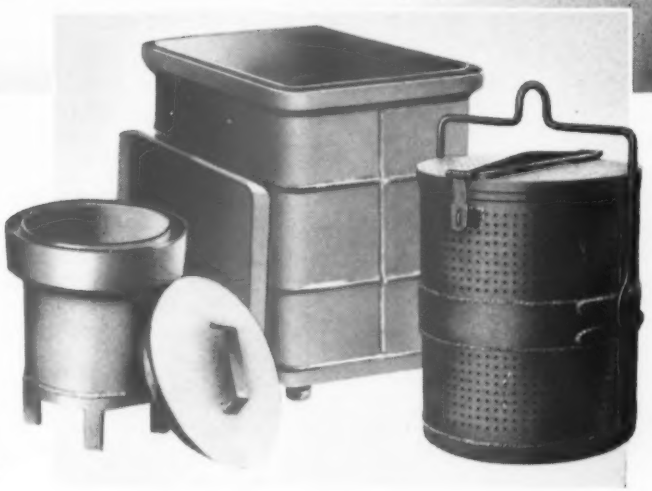
◄ **Long-life Orton Aero-Crane has most rigid car body of any crane built. Goes anywhere a truck will go. Operated, traveled and steered from craneman's seat.**

ORTON CRANE & SHOVEL COMPANY
608 South Dearborn Street, Chicago 5, Illinois

Cut HANDLING and FUEL COSTS

With THE PRESSED STEEL CO.

Light-Weight ANNEALING EQUIPMENT



SHORTEN HEATING CYCLE AND INCREASE FURNACE CAPACITY

Handling or heating unnecessarily heavy and bulky heat-treating equipment quite obviously represents waste. The truth of this statement is proved by records of plants the nation over, which have installed "Pressed Steel" annealing and carburizing units. By cutting 2/3 off the weight of this equipment, "Pressed Steel" units have effected these four savings:

1) FUEL SAVING--Made of light gauge welded sheet alloy, they require less fuel and time to attain pot heat.

2) LABOR SAVING--Handle easier and faster.

3) REPLACEMENT SAVING--Some installations have been in constant service for 20 years.

4) SPACE SAVING--Being less bulky than cast boxes, installations have frequently doubled furnace capacity.

We furnish a complete line of equipment for foundry and steel mill: annealing and carburizing boxes, covers, baskets, racks, tubes, retorts, etc. Welded alloy tubing to specifications. As the originators of light-weight heat treating equipment, we offer a wealth of experienced engineering assistance. Send us blue prints or write as to your needs.

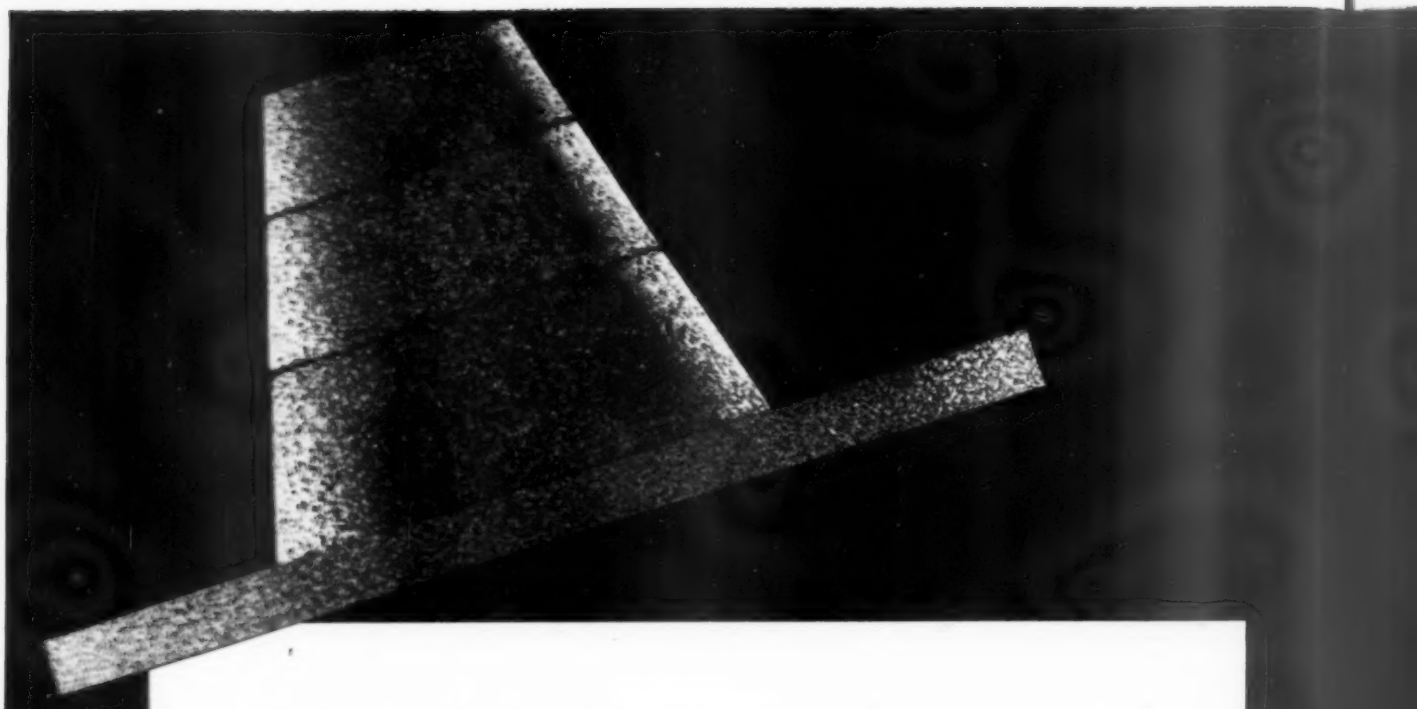
Above, several of the many types of "Pressed Steel" light-weight sheet alloy annealing units. As pictured, they are furnished in any size, as well as in any design or metal specification.

THE PRESSED STEEL COMPANY

of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆



Haunted by high grinding costs?

High grinding costs can be lurking unseen behind any of your grinding operations.

Often, only extensive training and experience in grinding-cost problems will rout them out for you. That's why it would pay you to let Peninsular engineers conduct your witch-hunt.

You see, they know where to look for excess grinding costs—and they look *everywhere!* Their skill is in their ability to examine *every* factor of your operations, and not miss a single possibility.

They start with a thorough examination and analysis of your particular grinding problems, your machines, your methods, the materials you grind.

Their recommendations cover not only wheel specifications, but ideal work speeds, wheel speeds, machine adjustments. Their analysis and their recommendations will include every factor that can increase your wheel life and stock removal, improve your finishes, and decrease dressing time and expense.

If anyone can cut your grinding costs, these experienced Peninsular engineers can. And the chances are overwhelming that your grinding costs *can be cut.*

When may a Peninsular engineer call on you?

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

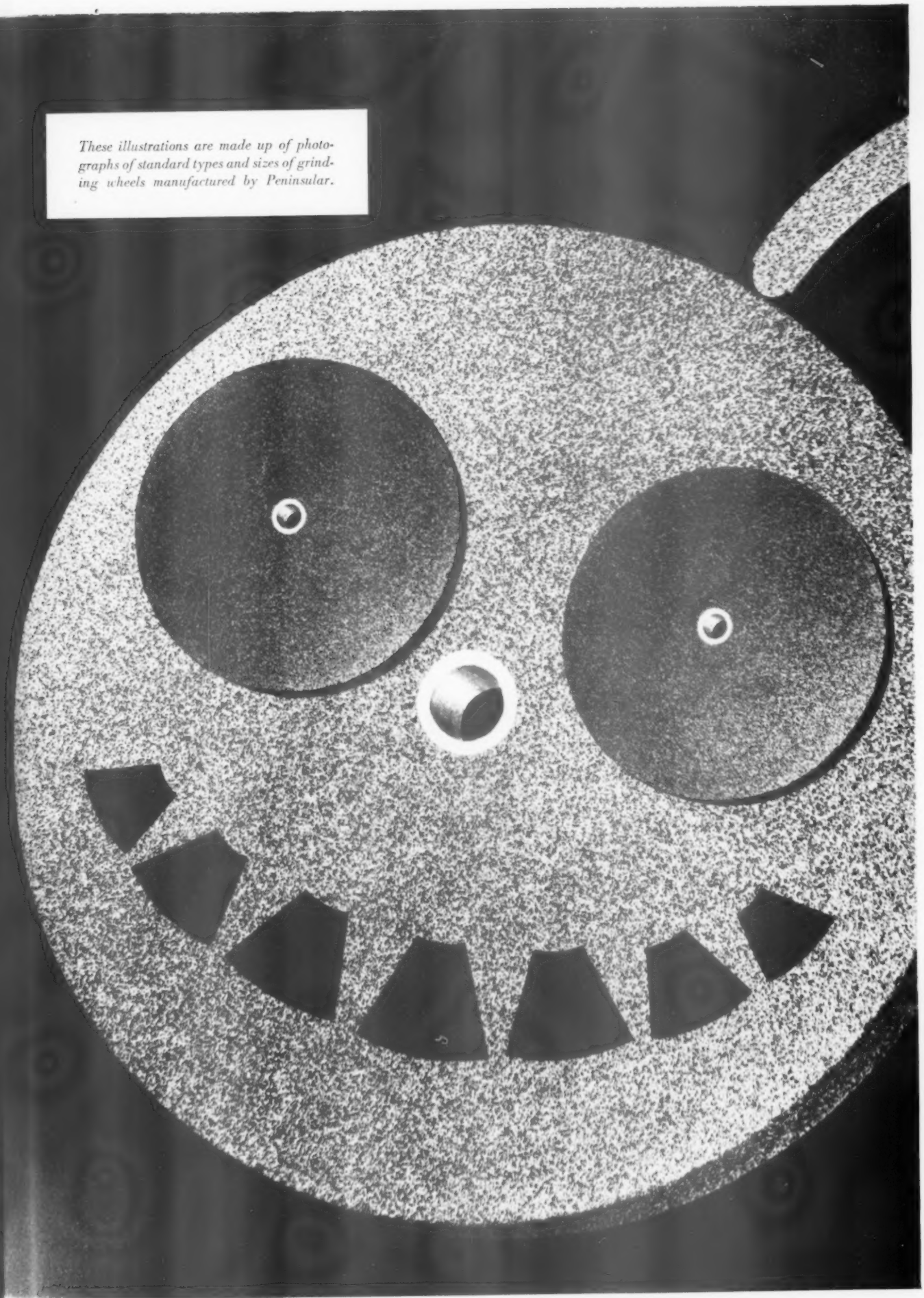
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

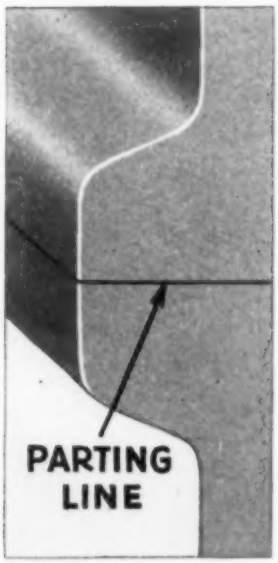
SPECIALISTS IN RESINOID BONDED WHEELS



These illustrations are made up of photographs of standard types and sizes of grinding wheels manufactured by Peninsular.

ONLY *Sterling* GIVES YOU

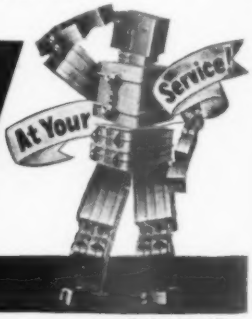
Accurately Machined Partings



The heavy special rolled steel sand flange on each Sterling Flask Section provides a full width bearing that permits partings to be accurately machined — not just surface ground, but planed to *an accuracy within .015"*. The flanges contain ample stock to allow re-machining several times if the occasion calls for it. This is merely one of the many exclusive Sterling features, assuring long flask life and a profitable investment. Write for Sterling Catalog No. 59.

In the above cross section of Sterling Flask, note the heavy square flanges, the full width bearing at the parting line, the solid center rib and angle reinforcement. Only Sterling gives you all these life-prolonging, cost-saving features.

Sterling FOUNDRY FLASKS



STERLING WHEELBARROW COMPANY • Milwaukee 14, Wis., U.S.A.

A 5474-1P

APEX

Research Leadership back of every Ingot

In the Apex laboratories, Apex research and facilities are devoted to producing better ingot, analyzing particular problems for foundries who use all methods of casting—sand, permanent mold, or die casting. Thus, Apex maintains always this high standard: "Best in every test from Ingot to Casting!"

Apex Smelting Co.

Chicago • Cleveland

2537 WEST TAYLOR STREET • CHICAGO 12, ILLINOIS
6700 GRANT AVENUE • • CLEVELAND 5, OHIO

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:
Can Technical Assistance be easily obtained?

ANSWER BY **CARBORUNDUM**
TRADE MARK

Through our district organization, located at more than a dozen key industrial centers, users of abrasives are offered direct access to the engineering, research and wide scale technical activities of The Carborundum Company. Staffed by selected men of experience, it is the purpose of this organization to represent The Carborundum Company locally It is their intelligent handling of abrasive problems and their sincerity in serving customers' needs that makes every user think first of CARBORUNDUM when they think of abrasives. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding...CALL IN

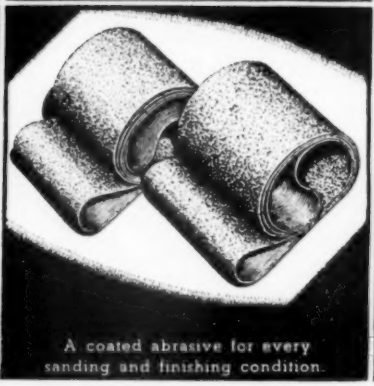
CARBORUNDUM
TRADE MARK

- BONDED ABRASIVES
- COATED ABRASIVES
- ABRASIVE GRAINS AND FINISHING COMPOUNDS

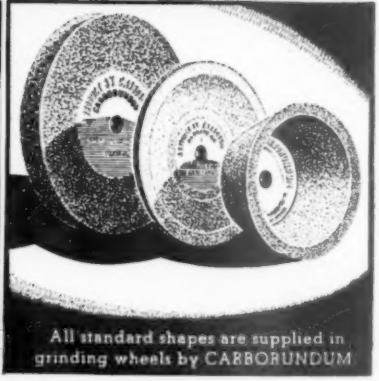
Specialized wheels by CARBORUNDUM for thread grinding.

Diamond wheels to meet stiffer technical needs.

Cool-cutting GREEN GRIT wheels for cemented carbide



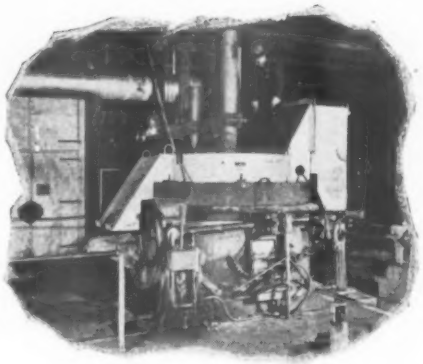
A coated abrasive for every sanding and finishing condition.

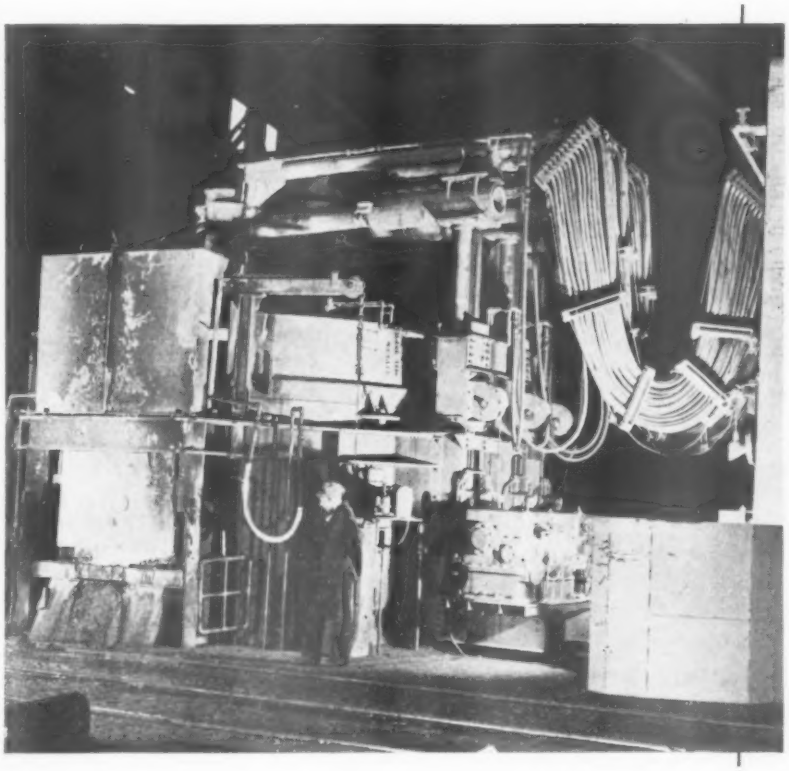


All standard shapes are supplied in grinding wheels by CARBORUNDUM

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.

Size is no excuse for not cleaning up your electric furnace





Large or small—There's an AAF Furnace Hood and Type N Roto-Clone to fit every furnace

ALL electric furnaces, regardless of size, are a source of smoke and fumes. And whether it is a 60-ton furnace with a 19 ft. roof ring, as shown at left, or a ½-ton unit with a 5 ft. roof ring, like the one above, these irritating by-products can be confined and removed by an AAF Furnace Hood and Type N Roto-Clone* hydro-static dust collector.

It's a complete job when you team these units together. The AAF Hood, while confining smoke and fumes, in no way interferes with furnace movement for pouring, slagging or charging. The Type N Roto-Clone applies local exhaust at the electrodes, charging door and pouring spout; scrubs oxides and smoke from the airstream before it is exhausted to eliminate a possible public nuisance.

The AAF Furnace Hood is applicable to either side or top-charge furnaces and its heavy construction prevents sagging or warping. In short, if you have an electric furnace, AAF has a practical, proven method for converting it into a smoke and fume-free operation. For complete information, call your local AAF representative or write direct to—

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

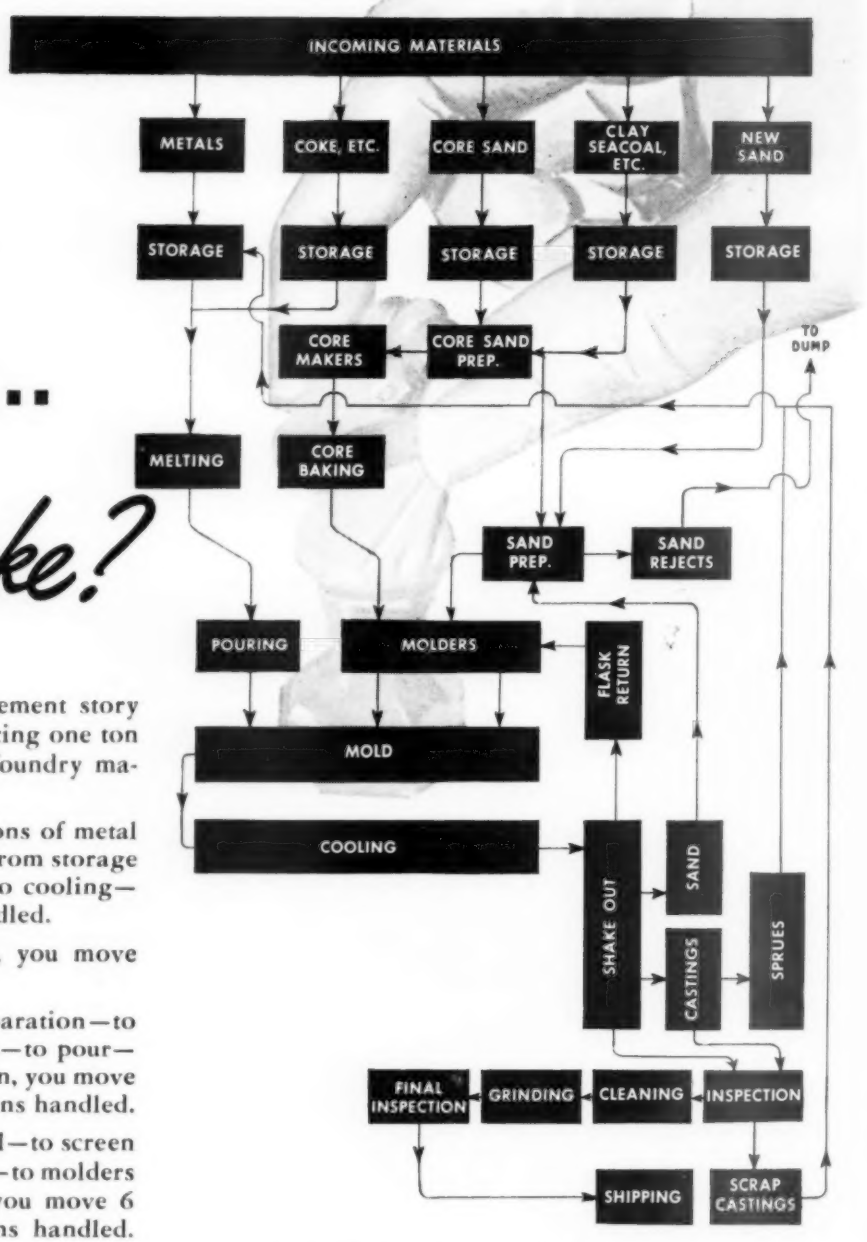
*Roto-Clone is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Co., Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.

MEMBER
MANUFACTURERS' ASSOCIATION INC.
FOUNDRY EQUIPMENT

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

HOW MANY MOVES.... *do you make?*



HERE'S the complete material movement story for the average foundry in producing one ton of castings as demonstrated on this foundry material flow chart.

METALS. Figuring an average of 1.3 tons of metal per ton of castings, you move 1.3 tons from storage—to melting—to pouring—to mold—to cooling—to shakeout for a total of 6.5 tons handled.

COKE, ETC. From storage to melting, you move .12 average tons.

CORE SAND. From storage—to preparation—to cores—to racks—to ovens—to molders—to pour—to cooling—to shakeout—to preparation, you move .5 tons of sand nine times. Total 4.5 tons handled.

SAND. From shakeout—to iron removal—to screen—to storage—to mullers for tempering—to molders—to pour—to cooling—to shakeout, you move 6 tons nine times for a total of 54 tons handled.

SAND REJECTS. From preparation tower to dump, you move 3 tons.

FLASKS. From molding station—to pour—to cooling—to shakeout—to molding station, you move 1 ton four times. Total 4 tons handled (not including boards and weights).

CASTINGS. From shakeout—to inspection—to cleaning—to grinding—to inspection—to shipping—to carrier, you move 1 ton six times (minimum). Total 6 tons handled (not counting heat treatment).

SPRUES AND SCRAP. From shakeout—to inspection—to remelt, you move .3 tons twice. Total .6 tons.

TONS. An average minimum of 78.72 tons of materials handled to produce one ton of castings in the average foundry.

A Rex Foundry Engineer will be glad to show you how you can reduce the cost of foundry material movement with a Rex Foundry System. Chain Belt Company, 1671 West Bruce St., Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

FOUNDRY HANDLING SYSTEMS

Whether you need a simple

SKIP HOIST...

or a COMPLETE CHARGING SYSTEM

Whiting can supply whatever you need in keeping with the nature of your operations and the funds available for mechanization.

We provide equipment for every phase of unloading, make-up, and cupola charging—individually designed for plant and yard layout—to provide the kind of job you need with greatest possible savings in manpower.

New Bulletin FY-153 illustrates and describes the many types of materials-handling and charging equipment which are available. We will gladly send you a copy on request.

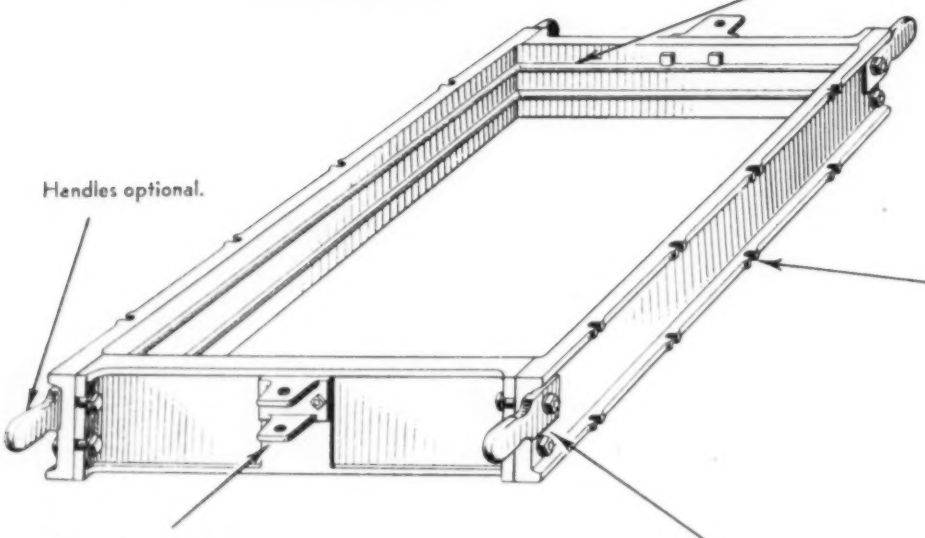
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

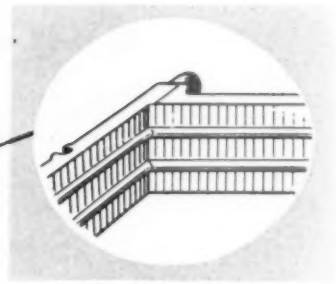
WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

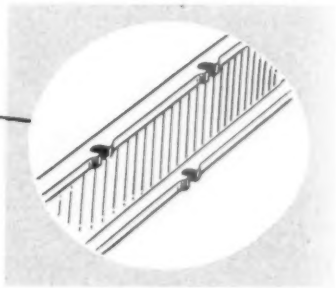
FLEXO-FLASK

All the Advantages of Solid Flasks Without the Limitations of Solid Construction

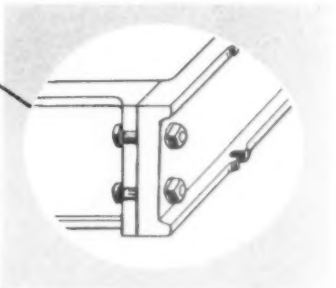




Sand ribs inside ends and sides of copes and drags.



Flanges slotted to permit bolting copes and drags together using ⅜" bolts. Bottom flanges of copes, top flanges of drags, machined to make close joint.



End and side corner joints machined to dimension.

All Aluminum . . . Save Storage

- Ends and sides standard in dimension and fully interchangeable.
- Ends available in widths 12 to 36 in.; sides, in lengths 12 to 36 in.; heights of copes and drags, 3 to 7 inches. Ends and sides increase by 2 in. multiples; height of ends and sides, by 1 in. multiples.
- Copes and drags fit together in innnumerable combinations to accommodate wide variety of sizes of molds.
- Easy to assemble or disassemble, using a common wrench.
- Flasks are shipped knocked down, in bundles, saving greatly on shipping space and transportation cost. Can be stored on shelves to save yard space, easy to assemble.

CO C. S. HUMPHREY CO., 1948

C. S. HUMPHREY CO.

249 2nd St., Moline, Illinois

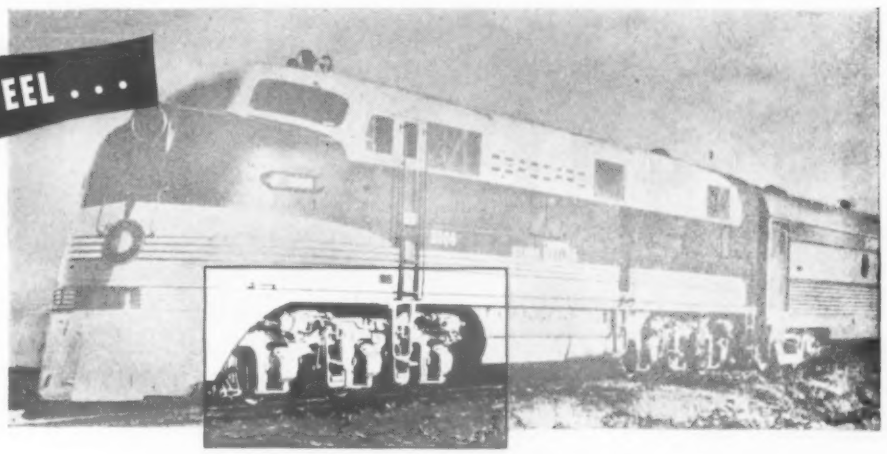
"ELECTROMET" VANADIUM

Trade-Mark

FOR THE PRODUCTION OF FINE STEELS

VANADIUM GIVES STEEL . . .

- ★ HIGH STRENGTH
- ★ INCREASED DUCTILITY
- ★ GOOD WELDABILITY
- ★ ABRASION RESISTANCE
- ★ TOUGHNESS



Springs, axles, and other parts of the trucks of high-speed diesel locomotives are made of vanadium steel. Vanadium is also used in steel for tools and machinery parts because of the exceptional properties that it imparts.

Vanadium improves steel by increasing its yield strength and its ductility. Vanadium-bearing steels are tough—because of their uniformly fine grain size—and resist abrasion, fatigue, and impact. They are especially suitable for parts subject to high dynamic stress.

Vanadium steels are readily cast, forged, and rolled. They are also easily machined, and have exceptional weldability. When vanadium is added to steel in quantities ranging from 0.05 to 0.20%, heat-treatment is simplified. Its use results in a tough, strong, wear-resisting surface on case-carburized parts.

ELECTROMET ferrovanadium is made especially for the manufacture of fine steels for tools and machinery parts. This ELECTROMET alloy contains 50 to 55% vanadium and is available for immediate delivery in grades containing maximum 0.20%, 0.50%, or 3.00% carbon. It is furnished in various crushed sizes suitable for all open-hearth and electric-furnace additions.

Our staff of competent metallurgists is always ready to furnish on-the-job technical assistance in the use of vanadium and other ELECTROMET ferro-alloys and alloying metals. Write to the nearest ELECTROMET office.

ELECTRO METALLURGICAL SALES CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC **New York 17, N. Y.**

OFFICES: Birmingham • Chicago • Cleveland • Detroit
New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet

TRADE-MARK

Ferro-Alloys and Metals

FOR SKIN DRY . . . DRY SAND AND GREEN SAND MOLDS AND CORES . . . USE . . .

DELTA BONDITE*

THE SUPERIOR, WATERPROOF ORGANIC BINDER THAT . . .

Cuts Production Costs!

DELTA BONDITE, the new waterproof organic binder for skin dry, dry sand and green sand molds and cores is a decidedly superior product . . . immediately available in any quantities . . . and considerably more economical to use.

HERE'S WHY . . . .

1. Removal of water by heat produces good tensile strength, very high compression and low hot strength.
2. To produce the above properties, no chemical reaction takes place thus resulting in stable sand surfaces on which the molten metal lays kindly.
3. The volatile gases produced by decomposition of BONDITE, ahead of the molten metal, are reducing in nature. This helps eliminate rough casting surfaces, burning-in and metal penetration.
4. Increased dry strength helps reduce buckling, scabbing, penetration and veining.
5. Prevents surface moisture absorption, becomes waterproof on drying.
6. Withstands high torch heat, will not cause edges of skin dry molds to crumble.
7. It is 98% volatile, leaves no excessive ash for sand contamination.
8. Clays, Bentonite, silica flour, fines or old sand have only a minor effect on its binding properties.
9. It is economical to use, reduces cleaning costs and greatly improves casting surfaces and soundness.

* Covered by U. S. Patents No. 2256832 for foundry use.

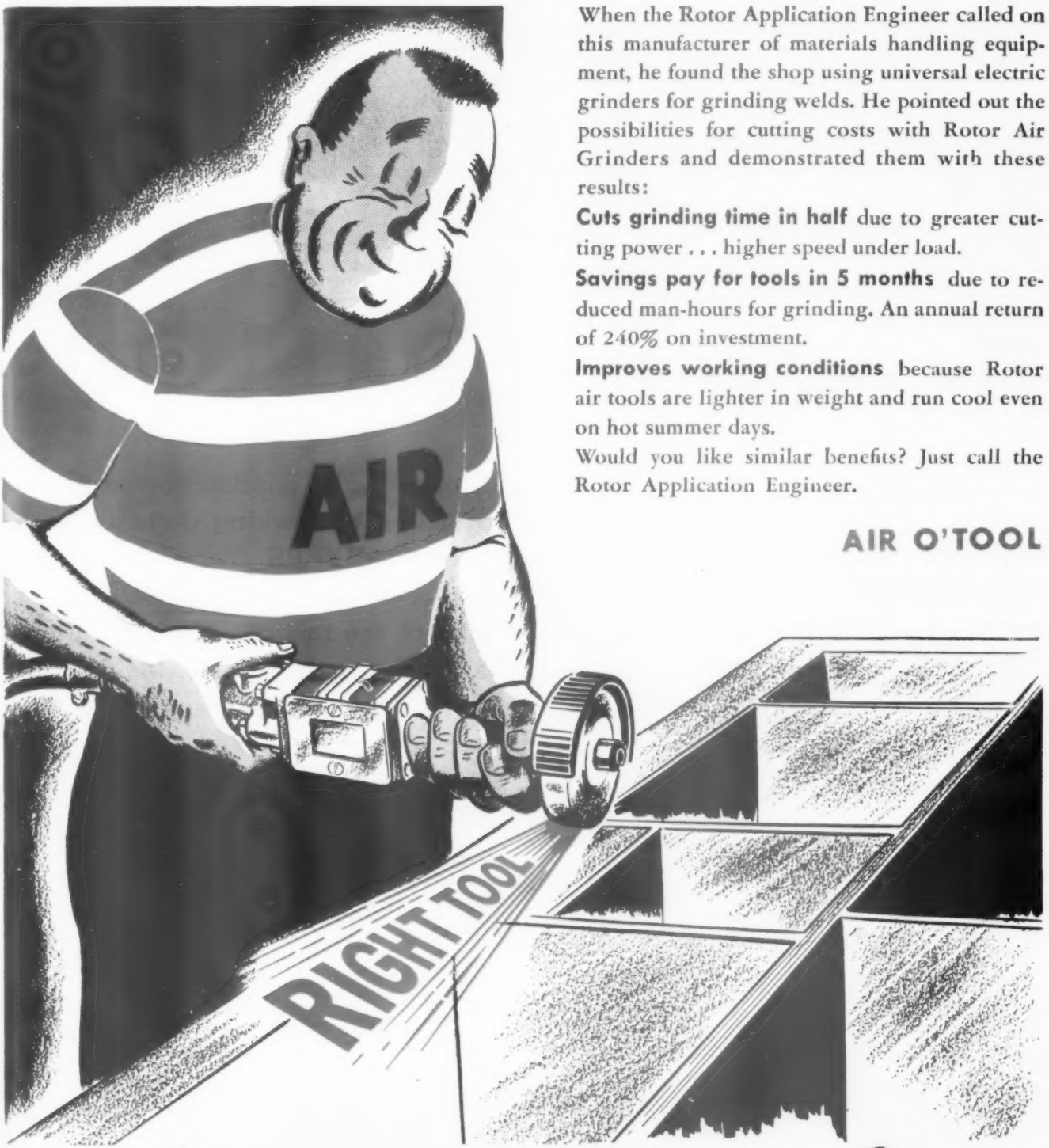
Ask for a working sample for test purposes and prove its superior qualities in your own foundry applications.

Complete data and specifications on the use of DELTA BONDITE will be mailed to you on request.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

Pays for itself in *5 months*



When the Rotor Application Engineer called on this manufacturer of materials handling equipment, he found the shop using universal electric grinders for grinding welds. He pointed out the possibilities for cutting costs with Rotor Air Grinders and demonstrated them with these results:

Cuts grinding time in half due to greater cutting power . . . higher speed under load.

Savings pay for tools in 5 months due to reduced man-hours for grinding. An annual return of 240% on investment.

Improves working conditions because Rotor air tools are lighter in weight and run cool even on hot summer days.

Would you like similar benefits? Just call the Rotor Application Engineer.

AIR O'TOOL

GREATER

in TONS per batch

When it comes to turning out more tons of properly conditioned and cooled sand, with resulting high mold capacity per working day, you just can't beat the high efficiency of SIMPSON MIXERS. Yet with this high productive capacity, you actually require fewer mixing cycles per hour, because of the large batch capacity of the mixers. Thus, with greater capacity and fewer mixing cycles, you have ample time to take frequent sand samples, to accurately determine and improve sand quality for a net result of more good castings at lower cost.

** Rated batch capacities of SIMPSON MIXERS are not theoretical figures . . . they are proved on the job in hundreds of large and small foundries all over the world. Ask to have a National Engineer show you how to increase production, improve quality and lower cost.*

BATCH CAPACITIES OF SIMPSON MIXERS*

No. 3½ Mixer	5000 lbs.
No. 3 Mixer	3000 lbs.
No. 2 Mixer	1500 lbs.
No. 1½ Mixer	700 lbs.
No. 1H Mixer	400 lbs.

* Based on actual practice in hundreds of foundries.

NATIONAL ENGINEERING COMPANY

608 MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

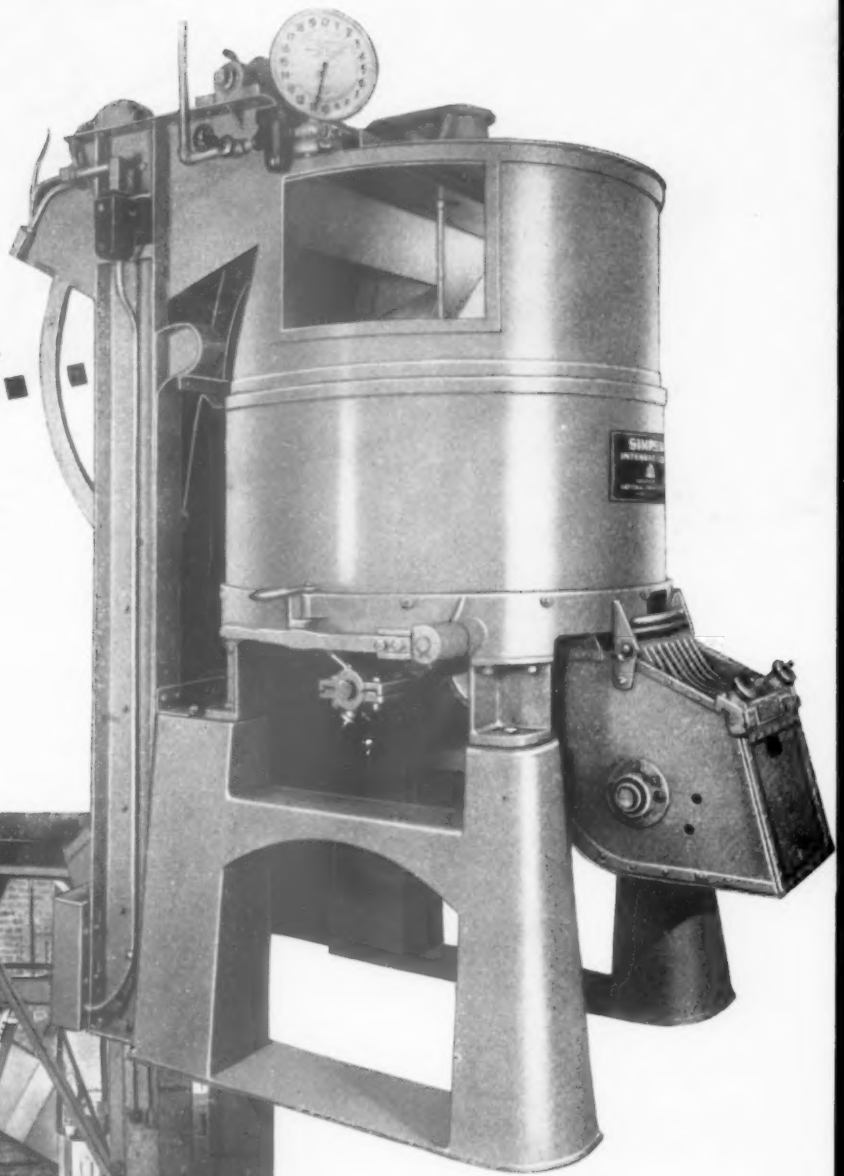
CAPACITY

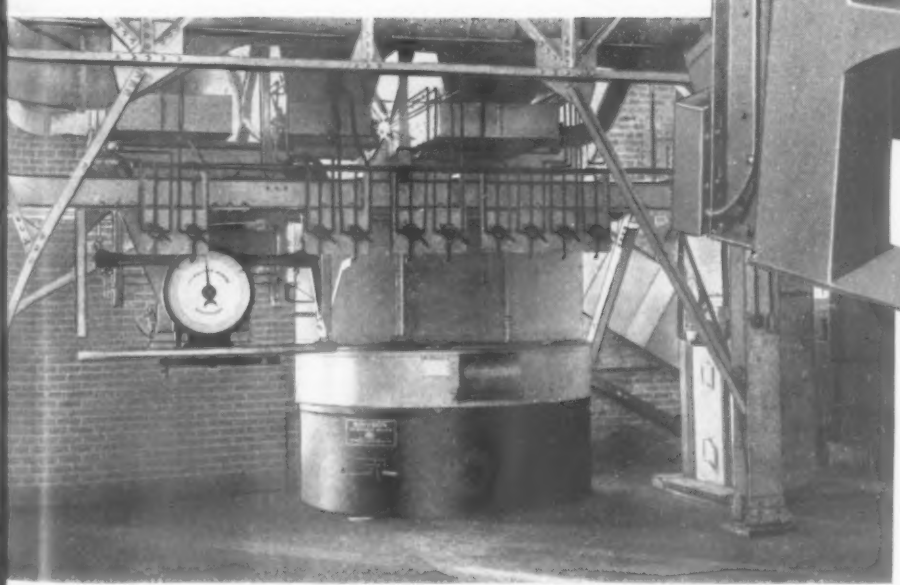
ch...

hour....

er

per day....

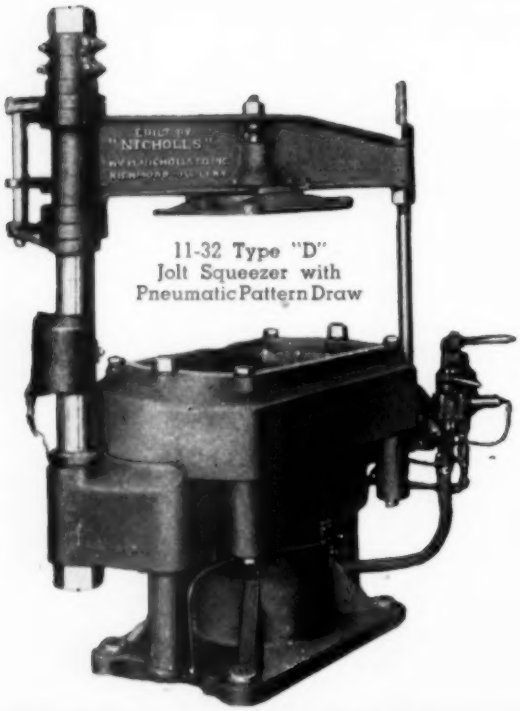




ABOVE: Typical No. 2 SIMPSON MIXER unit, with NATIONAL Bucket Loader, Aerator and Water Meter. LEFT: No. 3 SIMPSON MIXER preparing backing and facing sands in foundry of a large machine tool manufacturer.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia.



11-32 Type "D"
Jolt Squeezer with
Pneumatic Pattern Draw

YOU can count on NICHOLLS MOLDING MACHINES for faithful operation. Foundrymen, over a period of years have relied upon these rugged machines to withstand the pressure of continuous production, and their faith in NICHOLLS MACHINES to produce—consistently—the maximum number of molds, has never been shaken, resulting in meeting production schedules as planned with reduced costs, thereby creating substantial savings.

NICHOLLS has a complete line of stationary and portable types for the production of light, medium and heavy castings. All of these can be furnished with electric controls for push button operation.

Wm. H. NICHOLLS Co., Inc.

RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN — GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND

NICHOLLS

CHECK THIS LIST FOR RELIABLE NEW SOURCES

✓ABRASIVE WHEELS
✓CRUCIBLES and REFRACTORIES
✓CEMENTS-ALLOYS

Electro PRODUCTS AND SERVICES SATISFY THE SPECIAL REQUIREMENTS OF EXACTING INDUSTRIES!

Our understanding of the special requirements of exacting industries is intimate and detailed. That we should apply our engineering, metallurgical and chemical research and inventiveness to the advantage of these industries, is natural. But, while we are pardonably proud of our products for the metal working and ceramic industries especially, we attach even more importance to the job-side cooperation of our field engineers.

The products with which we serve industries (See Right-hand Column) suggest the special values to you of Electro Products and Services. As an approach to possible application of them to your objectives, we invite without obligation to you, a confidential statement of your problems.

Electro TRADE MARK SINCE 1919

"Electro" serves:

METAL AND CERAMIC INDUSTRIES
Non-Ferrous and Ferrous Foundries; Steel Mills and Smelters; Brass Rolling Mills; Heat Treaters and Annealers; Potteries; Art Potteries; Grinding Wheel; Sanitary Ware; Floor and Wall Tile; Electrical Porcelain; and miscellaneous Ceramic Plants.

THE AUTOMOTIVE, CHEMICAL, SHIPBUILDING
and Utilities Industries as well as Federal, State and Municipal Agencies.

with

1 ABRASIVE WHEELS
Abrasive Wheels—Resin-bonded, High-Speed Grinding Wheels to cover nearly every conceivable use from snagging and cutting operations to fine precision grinding.

2 CRUCIBLES
Crucibles, (Tercod-Conqueror) Pedestal Blocks and Pot Lids—The Carbon-bonded Crucible for melting aluminum—nickel—copper—the brasses and bronzes—zinc—silver—gold—iron, using any fuel: oil, gas, coke or coal, electricity.

3 REFRACTORIES
Special Refractories—Electric furnace refractories of all kinds used for:

Ceramic Kiln Furniture—Slabs and Posts for rigid, floating or semi-floating open construction; plate setters, tile setters, sanitary ware setters and silicon carbide saggers.

Muffles and Hearths—One piece and sectional for enameling furnaces, tunnel kilns, assay and heat treating furnaces, pottery kilns.

Crucible Furniture—Linings, covers.

Pyrometer Tubes—And tubes for other purposes.

Brick—9" series or special shapes to individual specifications.

Burner Blocks—And for electric furnace door blocks, door frames, port blocks and electrode sleeves.

Stopper Heads—For steel ladles; also slag hole and tap hole blocks for Cupolas.

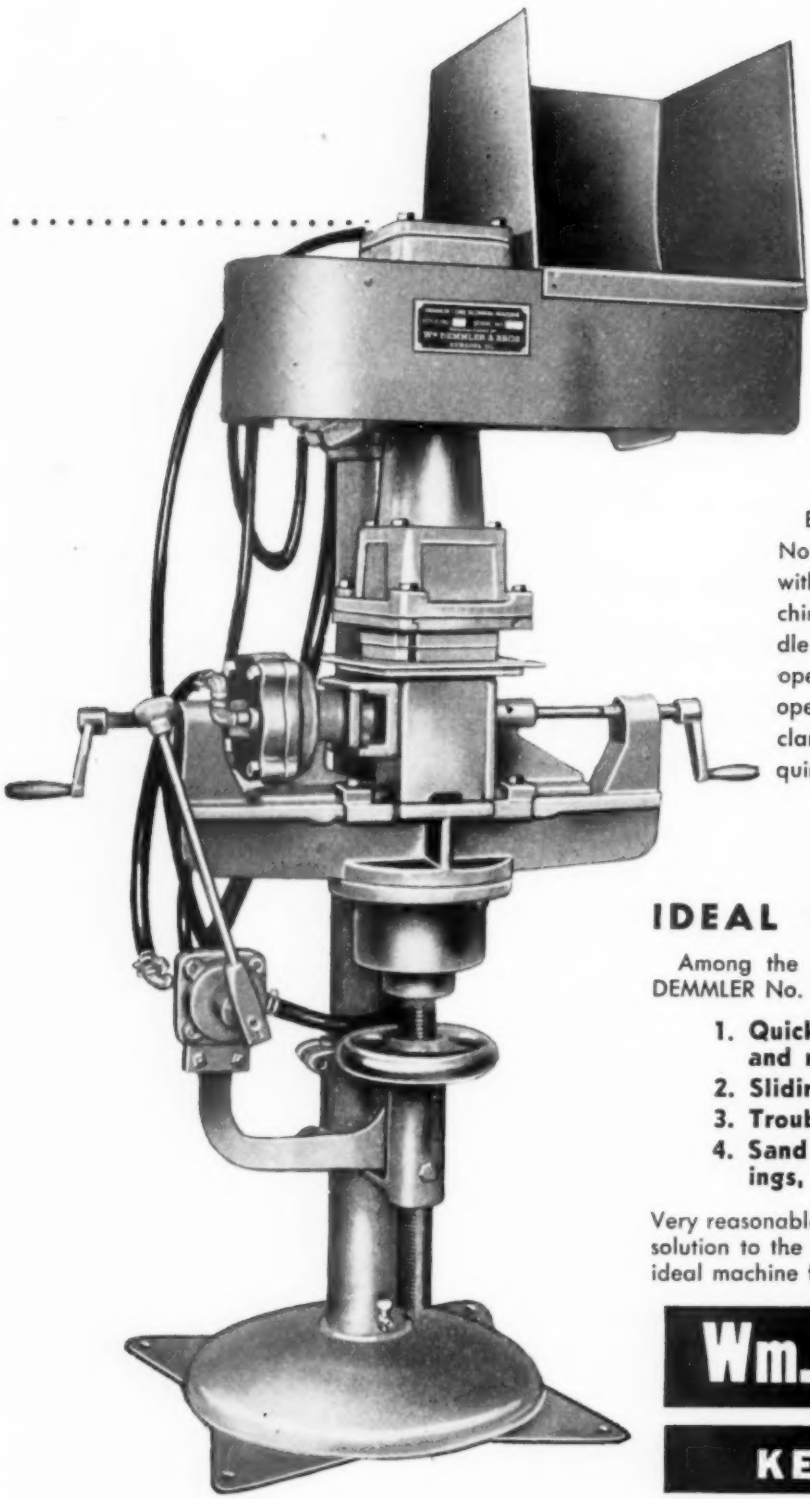
4 CEMENTS
Cements and Ramming Compositions—Of special refractories used by all industries; monolithic linings for electric, gas and oil furnaces; patching furnace walls, laying brick, boiler setting and ladle linings.

5 ALLOYS
ALLOYS—Special compositions for additions, deoxidation, degasification, purification: Copper—Aluminum—Chromium—Titanium—Nickel—Silicon—Magnesium—Iron—Lithium—Calcium—Calcium Boride—Tin—Zinc—Lead.

Electro Refractories & Alloys Corporation
344 DELAWARE AVE. West Coast Warehouse LOS ANGELES BUFFALO 2, N. Y.

DEMMLER Core Blower

NO. 55



A FAST CORE BLOWER EVERY FOUNDRY NEEDS AND CAN AFFORD

Because of its many features, the new Demmler No. 55 Core Blower was quick to gain popularity with foundrymen everywhere. This versatile machine will accommodate boxes 9 inches long—handle cores weighing up to 3 pounds. Sand magazine opening is 4½ by 9½ inches. A single hand valve operates both vertical and horizontal core box clamps and blows the core. Only 3 seconds required for complete cycle!

IDEAL FOR SHORT RUN JOBS

Among the many high quality features found on the new DEMMLER No. 55 are:

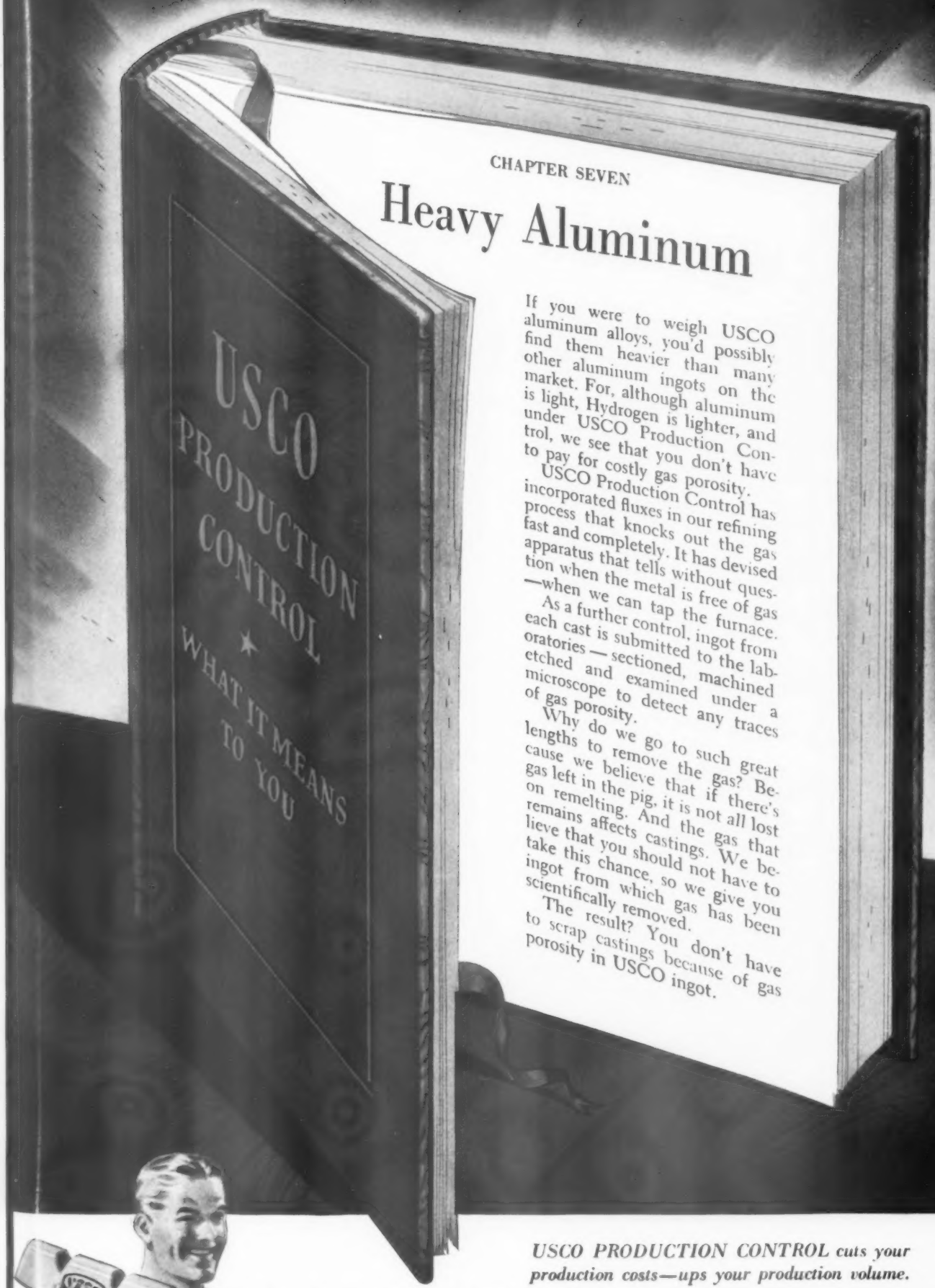
1. **Quick, easy adjustments for raising the table and moving chuck jaws.**
2. **Sliding, quick change blow plates**
3. **Trouble-free diaphragm type blow valve**
4. **Sand magazine and carriage of aluminum castings, with ball bearing rollers**

Very reasonable in price, the DEMMLER No. 55 is the economical solution to the rapid production of high quality small cores—an ideal machine for any foundry whether large or small.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

SEND FOR ILLUSTRATED SPECIFICATION SHEET



CHAPTER SEVEN

Heavy Aluminum

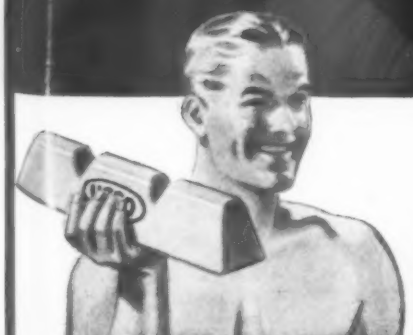
If you were to weigh USCO aluminum alloys, you'd possibly find them heavier than many other aluminum ingots on the market. For, although aluminum is light, Hydrogen is lighter, and under USCO Production Control, we see that you don't have to pay for costly gas porosity.

USCO Production Control has incorporated fluxes in our refining process that knocks out the gas fast and completely. It has devised apparatus that tells without question when the metal is free of gas —when we can tap the furnace.

As a further control, ingot from each cast is submitted to the laboratories — sectioned, machined etched and examined under a microscope to detect any traces of gas porosity.

Why do we go to such great lengths to remove the gas? Because we believe that if there's gas left in the pig, it is not *all* lost on remelting. And the gas that remains affects castings. We believe that you should not have to take this chance, so we give you ingot from which gas has been scientifically removed.

The result? You don't have to scrap castings because of gas porosity in USCO ingot.

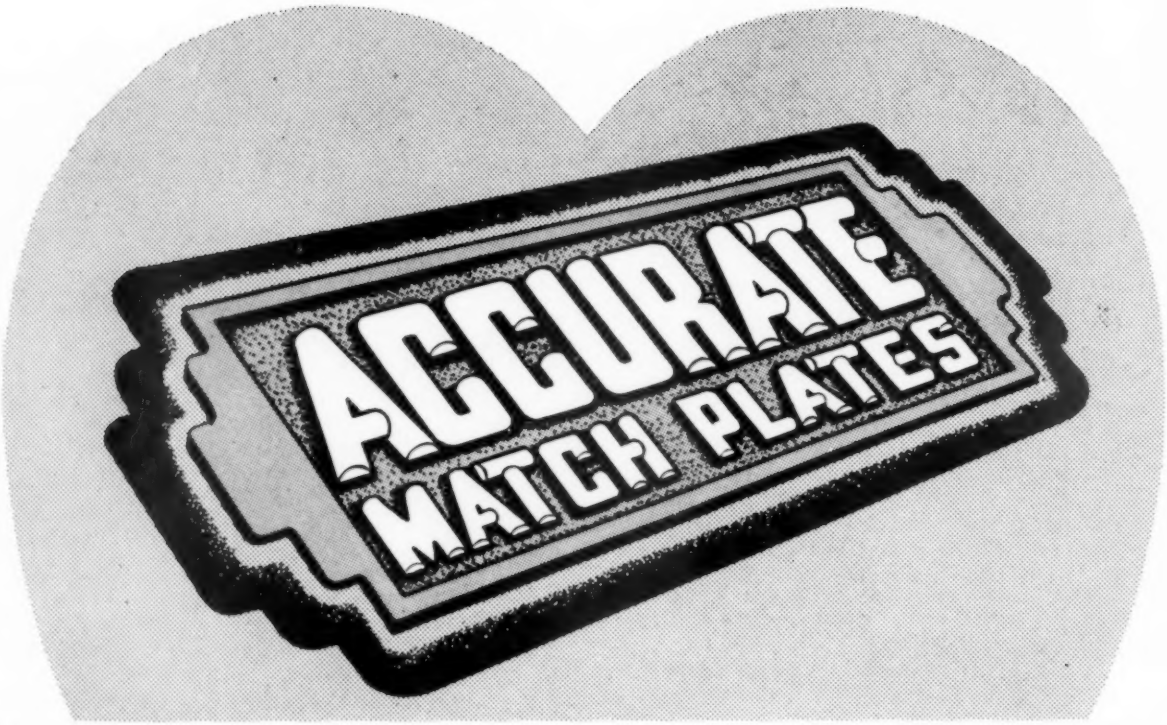


USCO PRODUCTION CONTROL cuts your production costs—ups your production volume.

USCO ALUMINUM

Pioneer Producers of Quality Aluminum Ingot

U. S. REDUCTION CO. *East Chicago, Ind.*



The heart of every casting is the pattern...so it has to be "accurate"

The ACCURATE MATCH PLATE COMPANY is a specialized organization with the ability to meet your requirements accurately.

We are foremost in the manufacture of pressure cast match plates, both as to quality and quantity.

Our plant is a modern building, housing specialized equipment and highly skilled artisans under able supervision.

We manufacture the following types of PRESSURE CAST EQUIPMENT from Plaster Molds:

Aluminum MATCH PLATES, COPE AND DRAG SETS,
CORE BOX CASTINGS, and white metal and aluminum
PATTERN CASTINGS.

Aluminum cast under pressure in plaster molds insures accurate dimensions, adherence to detail and smooth surfaces.

DESCRIPTIVE BROCHURE UPON REQUEST

QUICK DELIVERY BY RAIL EXPRESS OR AIR FREIGHT

Pick-up and delivery by jobber representatives in the following areas:

MILWAUKEE, WIS.
John M. Donohue
Bluemound 8-8989

WORCESTER, MASS.
Henry A. Kottmann
Auburn 2683

LOS ANGELES, CAL.
McGowan Company, Inc.
TRinity 2057

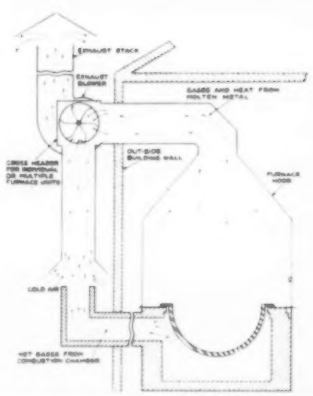
NORMAL, ILL.
Clarence C. Schmidlin
Normal 8743-1

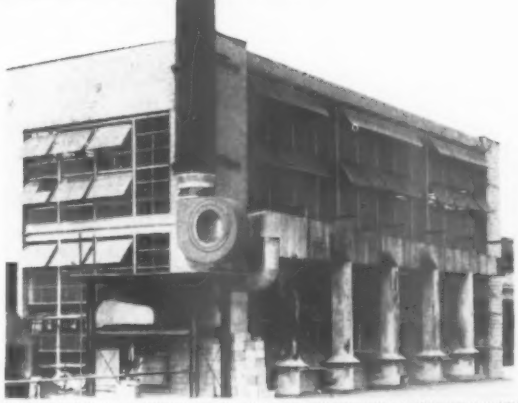
ACCURATE MATCH PLATE COMPANY
1847-51 W. CARROLL AVE., CHICAGO 12, ILL.
TELEPHONES: SEeley-3-7918, 3-7919

SCHULTZ of Toledo Likes STROMAN FURNACES

The Schultz Die Casting Company of Toledo, Ohio, famous for precision die castings melt their zinc alloys in this battery of Stroman Stationary Iron Pot Furnaces. Each of these furnaces, in this case being used as break down furnaces, has a capacity of 5,000 pounds of zinc. They are completely, automatically controlled . . . Thoroughly insulated against heat radiation . . . give longest pot life . . . and use a minimum of fuel.

These hooded Iron Pot Furnaces are designed to melt zinc, aluminum and all other white metal alloys. They efficiently exhaust all heat and fumes of combustion, making ideal working conditions and assuring utmost efficiency in production. They may be fired by oil, gas, or combination oil and gas burners. Capacities range from 212 to 14,000 pounds of zinc. Other metals in proportion.





This most modern and unique exhaust system is the result of the complete co-operation of Schultz Die Casting and Stroman Engineers. It assures a cool, clean melting room creating an ideal working condition for the operators . . . it keeps men on the job . . . and eliminates shut downs in hot weather. Please note that the combustion gases as well as heat and fumes from the molten metals are drawn through the wall of the building by the ducts of the ventilating system to the outside by means of an exhaust fan.

STROMAN MAKES ALL TYPES OF FURNACES, IRON POT, CRUCIBLE, TILTING AND REVERBERATORY FOR DIE CASTING AND PERMANENT MOLD PLANTS AS WELL AS FOUNDRIES. CONSULT WITH THEIR ENGINEERS ON ALL OF YOUR MELTING ROOM PROBLEMS—DO IT NOW!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

Round Flasks and J

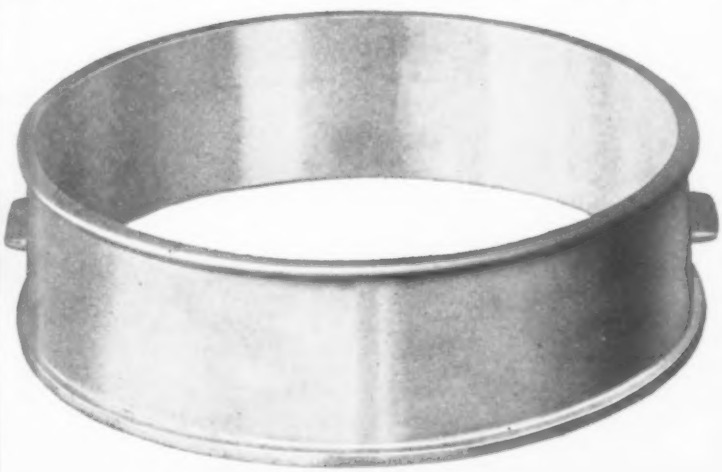
. . . SAVES TIME AND SA

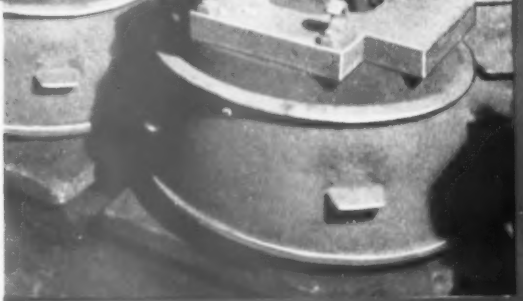
THE HINES

3431 WEST 140th ST.

d Jackets by Hines

ND SAND ON THESE JOBS

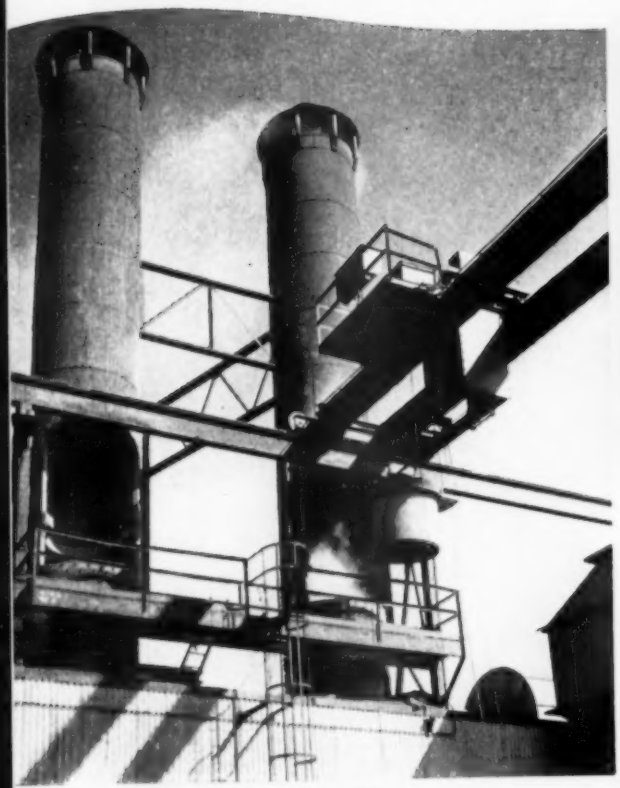




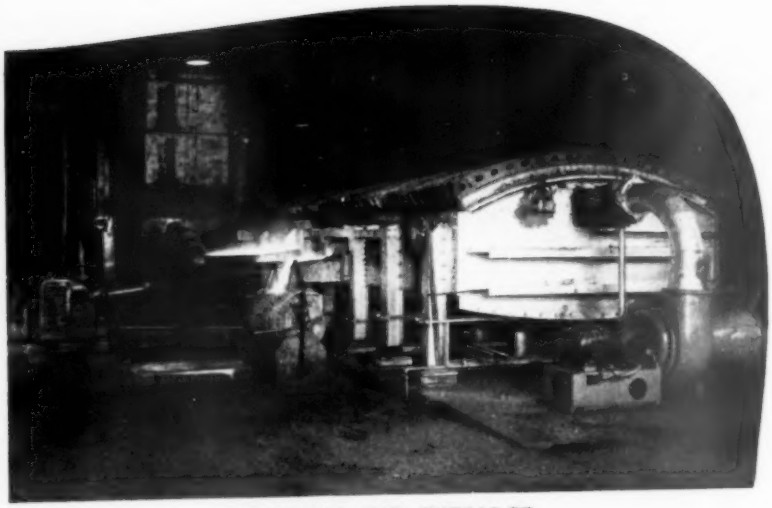
SF FLASK CO.

CLEVELAND 11, OHIO

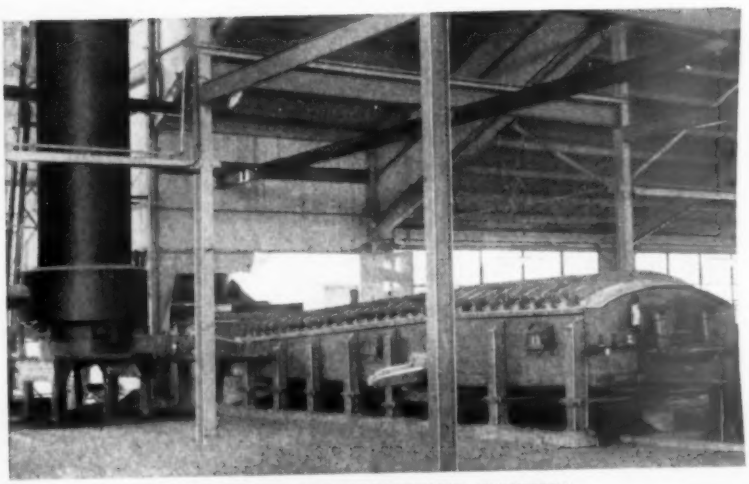
Do you make gray iron?



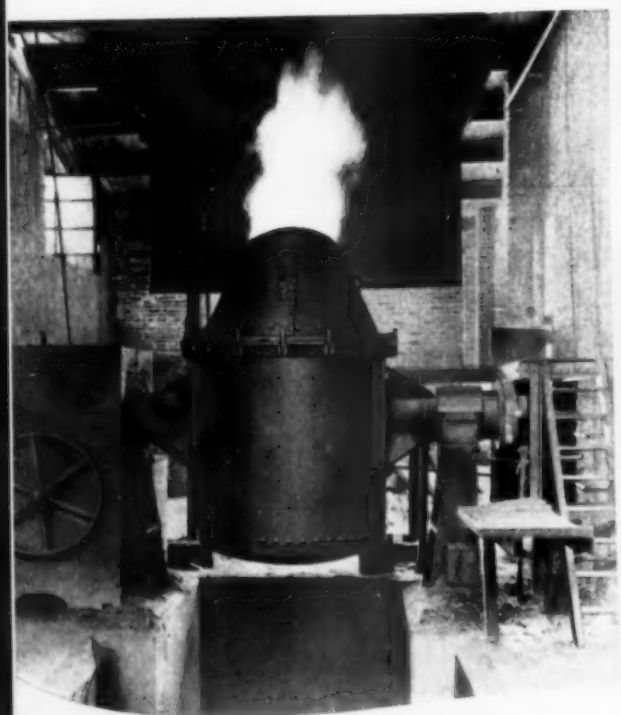
WHITING CUPOLAS



WHITING AIR FURNACE



WHITING DUPLEXING SYSTEM



WHITING SIDE-BLOW CONVERTER

WHITING CRADLE FURNACE

...malleable?...steel?

Let Whiting engineering "know-how" and experience help you get hotter, more uniform metal at lower cost

, . . . also better castings, reduced spoilage, and smoother operation.

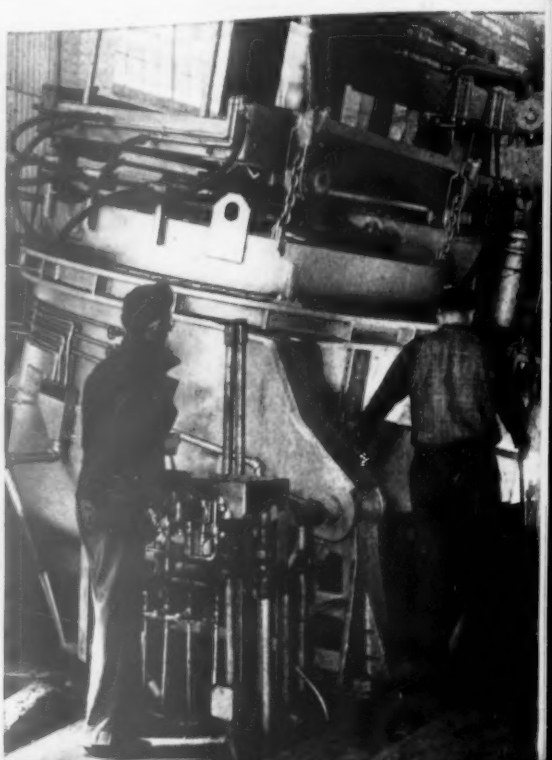
If you are following the methods of several years ago, it will pay you to re-examine your melting practices and ask Whiting for counsel and recommendations.

Whiting's *complete line* of successful melting equipment assures you that our recommendations are unbiased because we are able to supply any type best suited to your conditions. Write and ask to have a Whiting engineering representative call on you.

WHITING
CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

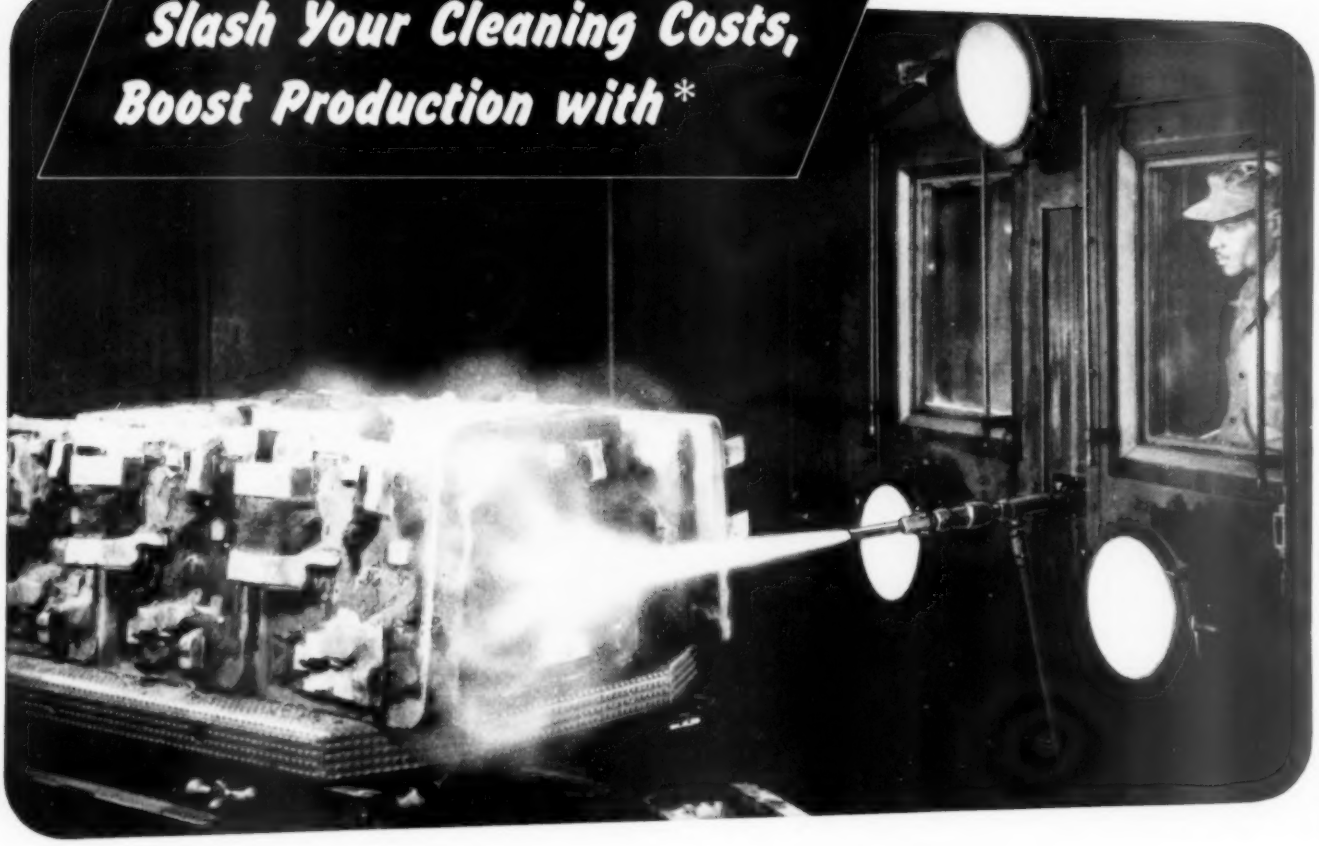
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

WHITING HEATED METAL MIXER



WHITING HYDRO-ARC ELECTRIC FURNACE

*Slash Your Cleaning Costs, Boost Production with**



*Pangborn Hydro-Sand Blast and Core Knockout

Here's How . . .

- Saves time, labor, material.
- Core knockout and cleaning done by one man in one operation.
- Work done in self-contained steel plate room while operator stands outside.
- Handling time cut to minimum.
- Complete recovery of sand and core rods.
- Total elimation of dust.
- Roughing and chipping costs reduced.
- Custom-Engineered to your individual requirements.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment.

IN ONE OPERATION, Pangborn Hydro-Sand Blast and Core Knockout makes an economical, clean, easy, safe job of core removal and sand blasting of large, medium and small castings.

WITH MAN POWER AT A MINIMUM, this new, modern installation propels a high-velocity stream of sand and water that blasts, cuts and cleans, eliminating dirt and dust . . . a cleaning room that "keeps itself clean."

CORE SAND IS RECLAIMED AND CORE RODS REMOVED *without sledge damage* with the Pangborn Hydro-Sand Blast and Core Knockout. This installation also makes subsequent chipping and finishing jobs cleaner, more economical, for it cleans quickly and thoroughly as the work rotates on its controllable table.

For complete information on the profit-saving Pangborn Hydro-Sand Blast and Core Knockout, write for free Bulletin No. 1100, PANGBORN CORPORATION, 1400 PANGBORN BLVD., HAGERSTOWN, MARYLAND.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

HERE'S HOW...

CHICAGO TRANSIT AUTHORITY CUTS MELTING TIME IN HALF

. . . cuts fuel cost 50% . . . cuts metal losses 40%

Chicago Transit Authority, one of the world's largest transportation systems, operating 2,400 streetcars, 1,625 elevated cars, and 1,100 buses, installed a Fisher oil fired Simplex Melting Furnace for remelting, reclaiming scrap, brass, and bronze. Journal and axle bearing brasses and worn parts from all types of rolling stock are melted down and recast into new parts.

The new Fisher Simplex replaces a conventional oil fired spherical type open flame furnace. Check this "Before and After" story of faster melting, lower fuel cost, and lower metal losses.

	BEFORE	AFTER
Heating time 1000 lb. charge	2½ hrs.	1 hr.
Fuel cost per pound melted	$.0056	$.0027
Metal Loss	5%	3%

Ask for bulletin #28-A "Fisher Simplex Furnaces."

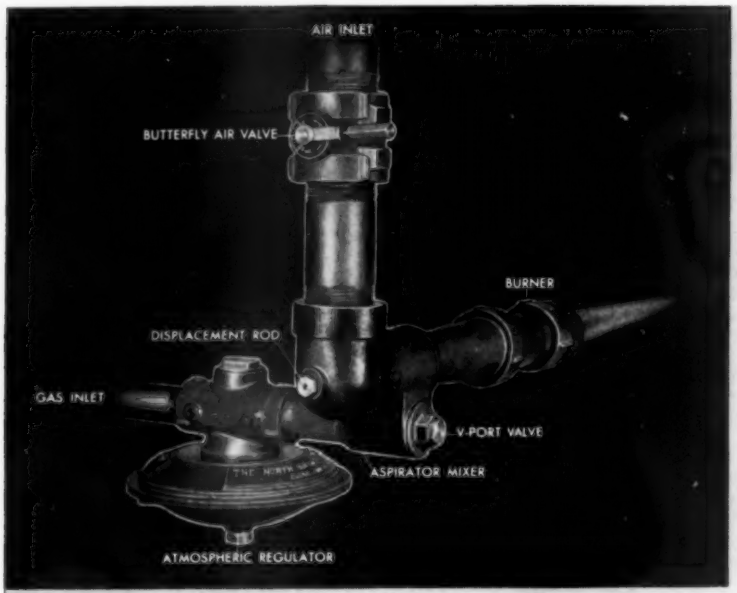
FISHER ADVANTAGES

Furnace charges *easily* from front at convenient height. . . . More metal can be charged as bath occupies but a *fraction* of melting chamber . . . Uses open flame reverberatory melting, the *fastest* fuel fired melting method . . . Two section furnace shell removable for *easy* relining.

Fisher Furnaces

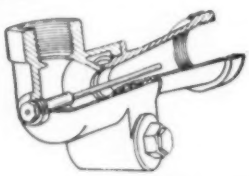
A DIVISION OF LINDBERG ENGINEERING CO.

2458 West Hubbard Street, Chicago 12, Illinois



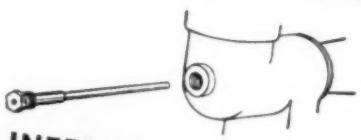
NORTH AMERICAN *Aspirator Mixers*

UNEQUALLED *for* EFFICIENCY *or* ADAPTABILITY



EFFICIENT DESIGN

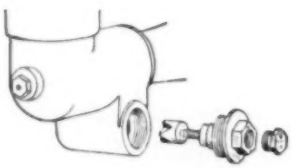
and precision manufacture of the internal parts enable the air flowing through the mixer to create enough suction to draw the gas into the mixer and deliver an intimate mixture of gas and air to the burners at high pressure.



INTERCHANGEABLE ROD

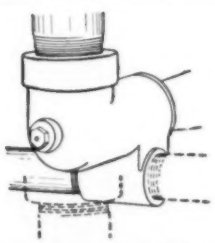
permits changing the orifices to conform to the particular conditions found in the field and still provide the optimum mixture pressure and suction ratios for the job at hand. Standard rods of varying diameters are interchanged without breaking any piping. Easily adjustable for greater mixture pressure with lower suction, or lower mixture pressure with higher suction.

NORTH AMERICAN *for* COMBUSTION



SENSITIVE V-PORT ADJUSTMENT

provides positive setting of the gas-air ratio on any gas from 500 to 3200 Btu per cubic foot (20 complete turns of the valve are required to go from fully open to fully closed).



COMPACT, FLEXIBLE DESIGN

makes the North American Aspirator Mixer easy to install on any industrial furnace or oven. Over-all length not excessive.

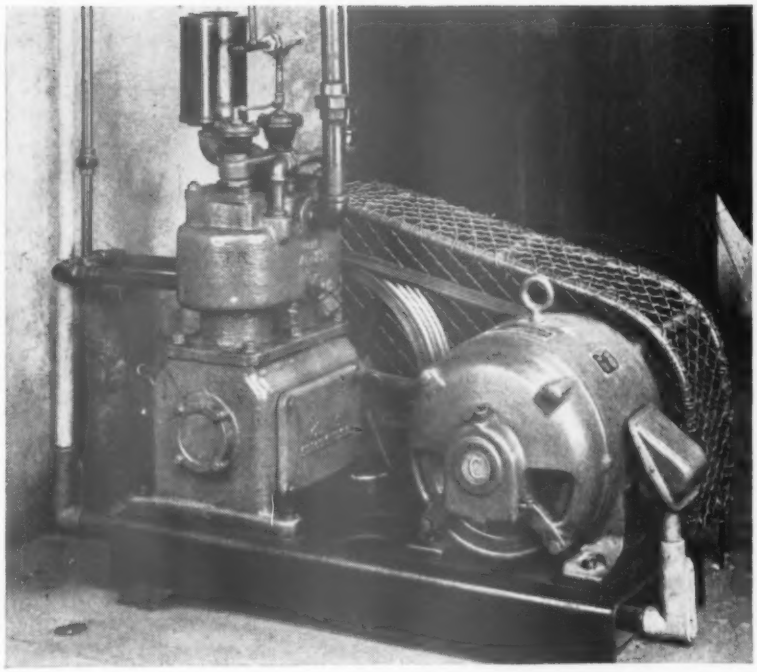
THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND 5, OHIO

Curtis Timken Bearing Air Compressor. Sizes from ¼ to 50 H. P., inclusive.



RELIABILITY
That Pays Off in Low-Cost Performance

CURTIS TIMKEN BEARING AIR COMPRESSORS

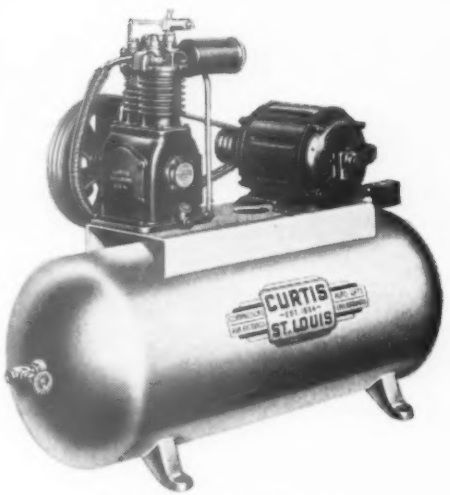
WHATEVER the application, in thousands of varied industrial installations, Curtis Timken Bearing Equipped Air Compressors have a long and proven record of extreme reliability, low maintenance expense and unusually long life.

Every Curtis Air Compressor has been carefully engineered, made of the highest quality materials and precision built throughout.

Their dependable, economical performance is the result of such design advantages as:

- Timken Roller Bearings
- Self-Oiling—Positive Lubrication
- Carbon-Free Disc Valves
- Automatic Pressure Unloader
- Fully Enclosed Design
- Precision Construction

Specify CURTIS when you want a reliable, low-cost supply of air for *any* use. Capacities from ¼ to 50 H.P. (up to 300 CFM).



Curtis Timken Bearing Air Compressor with tank. Sizes from ¼ to 10 H.P., inclusive.

Write today for full information on Curtis Air Compressors, Air Hoists and Air Cylinders—or mail the coupon below.

1-48-1

CURTIS

PNEUMATIC MACHINERY DIVISION

of Curtis Manufacturing Company

1922 Kienlen Avenue • • St. Louis 20, Missouri

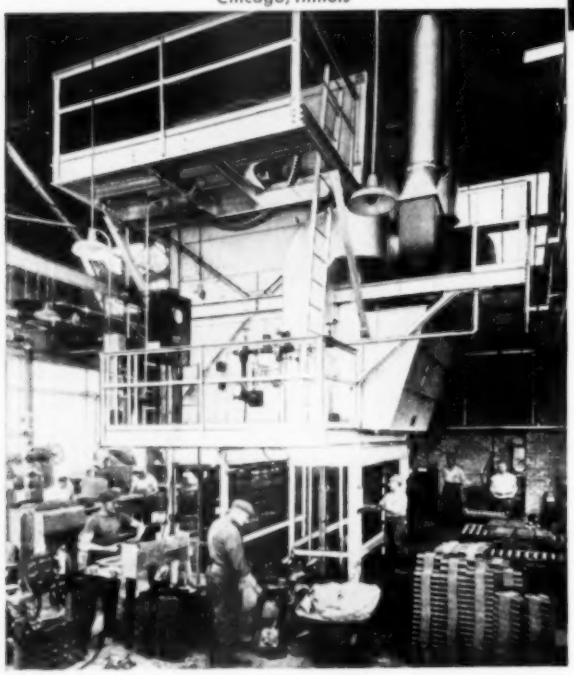
94 Years of Precision Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION *of Curtis Manufacturing Company*
1922 Kienlen Avenue, St. Louis 20, Missouri

Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

Name .....
Firm .....
Address .....
City ..... Zone ..... State .....

Two views of Coleman Tower Oven at Wells Manufacturing Co., Chicago, Illinois



COLEMAN T

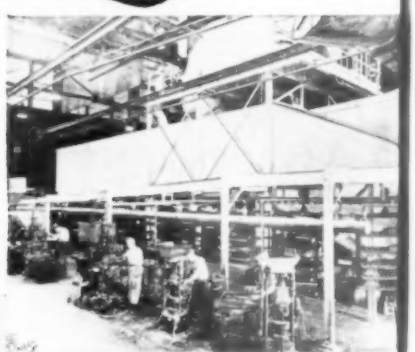
says H. W. JOHNSON... Wells Manufacturing Co.

"Our selection of a Coleman Tower Oven has proved to be a wise choice. Through its use our core-room is completely free from noxious fumes and smoke and gives our employees a highly desirable place to work. We find little trouble in getting men to work in this department which heretofore was extremely difficult.

"Easy accessibility to the oven trays from the core-blowers and core-benches has resulted in increased production. Also we find that the oven is capable of baking more cores per eight hour day than originally anticipated, thereby helping to increase overall foundry production."

A FEW REPRESENTATIVE COLEMAN TOWER OVEN OWNERS

Landers, Frary and Clark
Lynchburg Foundry Co.
Ferro Machine & Foundry Co.
Grede Foundries, Inc.
Westinghouse Electric Corp.
Ross-Meehan Foundries
Eastern Malleable Iron Co.
Scovill Manufacturing Co.
National Mall. & Steel Cast. Co.
Minn.-Moline Power Implem. Co.
H. C. Macaulay Foundry Co.
Singer Manufacturing Co.
Hamilton Foundry & Machine Co.
Lincoln Foundry Co.
Campbell, Wyant & Cannon Co.
Cincinnati Milling Machine Co.
American Steel Foundries
Ohio Steel Foundry Co.
Benton Harbor Mall. Ind.
Republic Brass Co.
Chicago Mall. Cast. Co.
Oberdorfer Foundries Inc.
Lake City Malleable Co.
Pontiac Motor Car Division
Wolverine Brass Works
Stockham Pipe Fittings Co.
Production Foundries Div. of Jackson Industries, Inc.



COLEMAN HORIZONTAL CORE OVENS
Overhead conveyor ovens specially design for large scale production foundries in su fields as agricultural, automotive, etc.

COLEMAN HEATING SYSTEMS USE THE MOST ECONOMICAL FUEL AVAILABLE TO YOU: GAS, OIL, STOKER-COAL, ELECTRICITY, ETC.

The FOUNDRY EQUIPMENT CO

CLEVELAND 13, OHIO, U. S. A

BUILDI AND SY

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALIST OVER

TOWER* Ovens

IMPROVE WORKING CONDITIONS ...INCREASE PRODUCTION

● Foundries everywhere have increased production and improved coreroom working conditions with Coleman Tower Ovens for these reasons:

PATENTED OPEN CENTER: Provides close, efficient grouping of coremakers around the oven. The exclusive 3-way loading feature increases accessibility 300% over ordinary vertical oven designs. Cuts carry time... increases productivity.

AMAZING FLOOR SAVING: The elimination of racks, aisleways, and large working space required by batch ovens permits savings up to 75% in floor area. Less space... greater output.

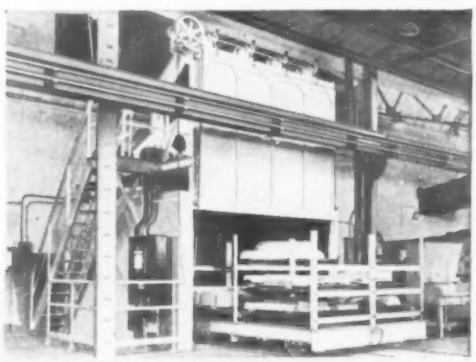
PERFECT BAKING: The Coleman heating system produces perfectly baked cores with unusual speed. Eliminates rejects and make-overs.

RECUPERATIVE COOLING SYSTEM: Cores are "smoked off" and cooled before they reach the unloading station, making for better working conditions. The heat recovered from the cores is used over again, resulting in large fuel savings.

*Trademark Reg. U. S. Pat. Off.

WRITE TODAY FOR BULLETIN 48

COLEMAN TOWER OVENS ARE AVAILABLE IN A WIDE RANGE OF SIZES AND CAPACITIES FOR VARIOUS PRODUCTION NEEDS, ASSURING DEPENDABLE PERFORMANCE AT LOWEST POSSIBLE COST



★ **COLEMAN CAR-TYPE OVENS**

For baking large cores or drying molds. Coleman Car-Type Ovens are used by most of the leading producers of heavy castings.

★ **COLEMAN TRANSRACK OVENS**

For use with portable racks to reduce handling labor. Very efficient where ample floor space is available.

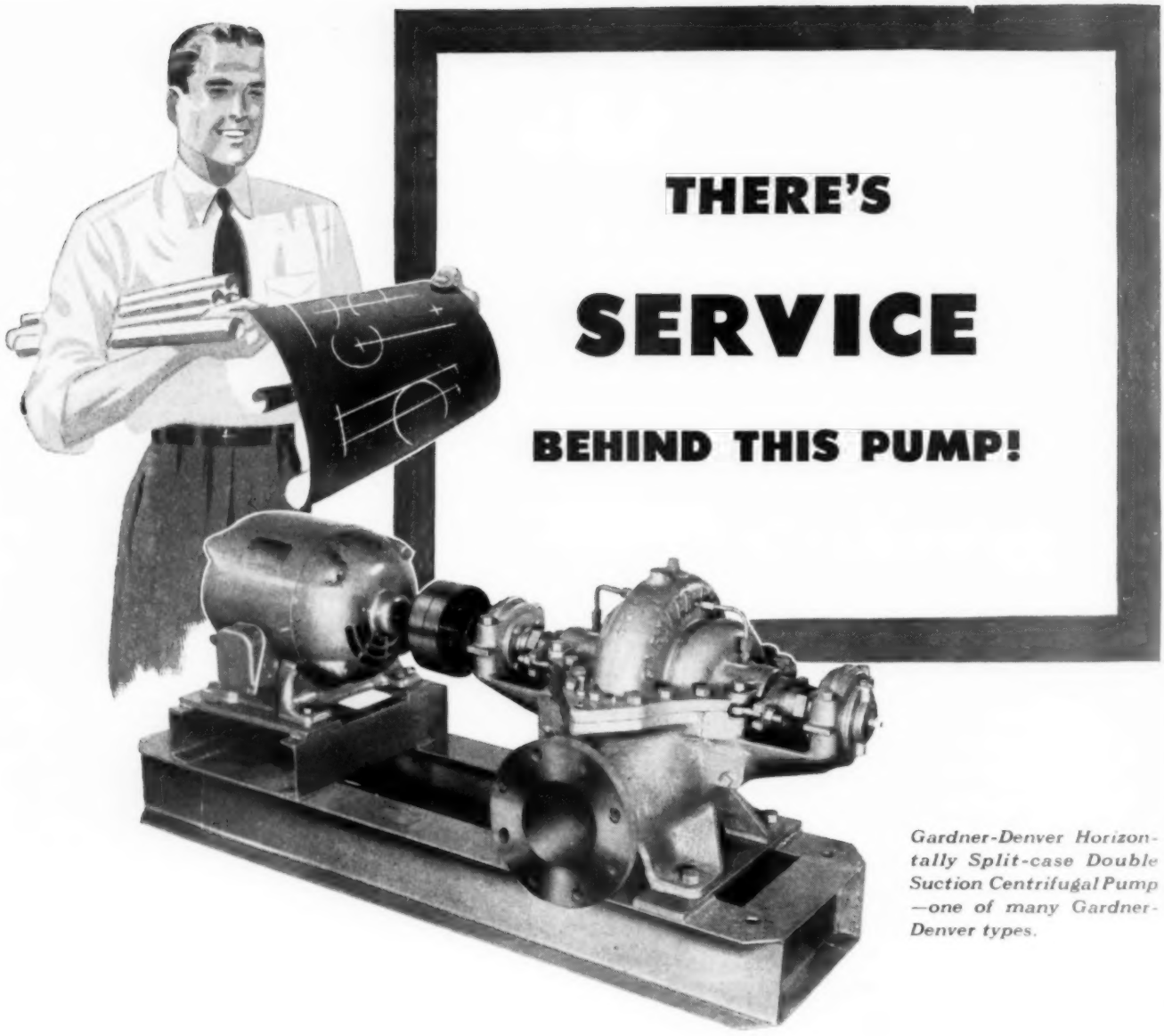
COMPANY

BUILDERS OF COLEMAN AND SWARTWOUT OVENS

MEMBER MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

COLEMAN
CORE AND MOLD OVENS

OVER 9000 SUCCESSFUL INSTALLATIONS



THERE'S SERVICE BEHIND THIS PUMP!

Gardner-Denver Horizontally Split-case Double Suction Centrifugal Pump —one of many Gardner-Denver types.

Two things are needed to provide complete satisfaction when you buy a centrifugal pump—a quality product *and* quality service. For often you want skilled advice in choosing exactly the pump for your needs—advice backed by research and field experience. Often, too, you require friendly, expert help in getting the most out of your pump after it is installed.

All Gardner-Denver Centrifugal Pumps are sold with this backing of service—always at your command—always available at your call. Gardner-Denver branch offices, located in principal centers throughout the country, stand ready to keep your Gardner-Denver pump at peak efficiency year after year.

For superior pumps—AND superior service—write Gardner-Denver.

Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER SINCE 1859

Paired for Production!

HOUGH SAY "HUFF" **PAYLOADER** PATENT 2,412,323

and

PAYLOADER PATENT 2,412,323 **BUGGY**

Here is a profitable pair of production boosters for long-haul materials handling in the foundry industry — the well known, widely used Model HA Payloader Shovel and the new Payloader Buggy. Shovel and Buggy are teammates in every respect . . . are matched in power, speed and operation and also have interchangeability of almost all parts — an important service-economy feature for users of both units.

The Payloader Buggy has a capacity of 2 cu. yd. or 5,000 lbs. . . . carries any bulk material, dumps easily by hydraulic power. Payloader Shovels and Buggies have low height, rear wheel steer, short turning radius, large easy-rolling wheels, powerful hydraulic brakes and are easy to operate. They will travel through narrow aisles and in congested, low head-room areas. Information on the Payloader Buggy or any and all sizes of Payloader Shovels will gladly be supplied on request, also the name of your Hough distributor who sells and services these profitable, production-boosting machines.

SEND TODAY for bulletins on the Model HA 10½ cu. ft. Payloader, the ¾ yd. Model HF, the 1¼ yd. Model HL, the 2 yd. Payloader Buggy.

THE FRANK G. HOUGH CO.

703 Sunnyside Avenue — Libertyville, Illinois

TRACTOR SHOVELS SINCE 1920

A Reliable Source of
STANDARD HIGH-CARBON
FERRO-MANGANESE

At Ohio Ferro-Alloys Corporation, every order for Standard High Carbon Ferro-Manganese is processed with utmost care to insure prompt delivery of a product of highest quality and uniformity.

In Briquets, too

You can also have Ohio Ferro-Alloys Standard High-Carbon Ferro-Manganese in briquets for cupola additions. (Colored red for easy identification.)

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

HOW TO STOP LOSING DOLLARS

when making and baking cores

IN THE MIX . . .

By replacing part of the core oil with less expensive Hercules Truline Binder, you get quicker and more thorough core oil oxidation and a mix that costs less.

IN THE OVEN . . .

Truline-bonded cores bake up to 25% faster than all-oil-bonded cores, save valuable time. They bake uniformly, often eliminate one extra trip through tower ovens.

IN STORAGE . . .

The moisture resistance of Hercules Truline Binder keeps cores strong over long storage periods.

IN POURING . . .

Truline-bonded cores give you a greater margin of safety at pouring time. *Truline* reduces the possibility of gas holes, scabs and blows, caused by unoxidized core oil.

IN SHAKE-OUT . . .

Truline-bonded cores, as opposed to pitch-bonded cores, burn out quickly, shake out faster, save up to 50% of valuable cleaning time. This saving alone makes Truline worth while.

HERCULES

TRULINE
REG. U.S. PAT. OFF.
BINDER

HERCULES POWDER COMPANY
INCORPORATED
920 King St., Wilmington 99, Del.

NF8-2

Scientific

Control

• There's no room for guess-work in the proper application of core washes and mold coatings. The technical and highly specialized nature of such foundry operations demand products that are unquestioned in *quality*, unquestioned in *uniformity*. Because of such exacting demands, all Thiem products are *laboratory controlled* every step of the way. Scientifically sound in content, Thiem products possess that all-important quality of *consistent uniformity*.

THIEM

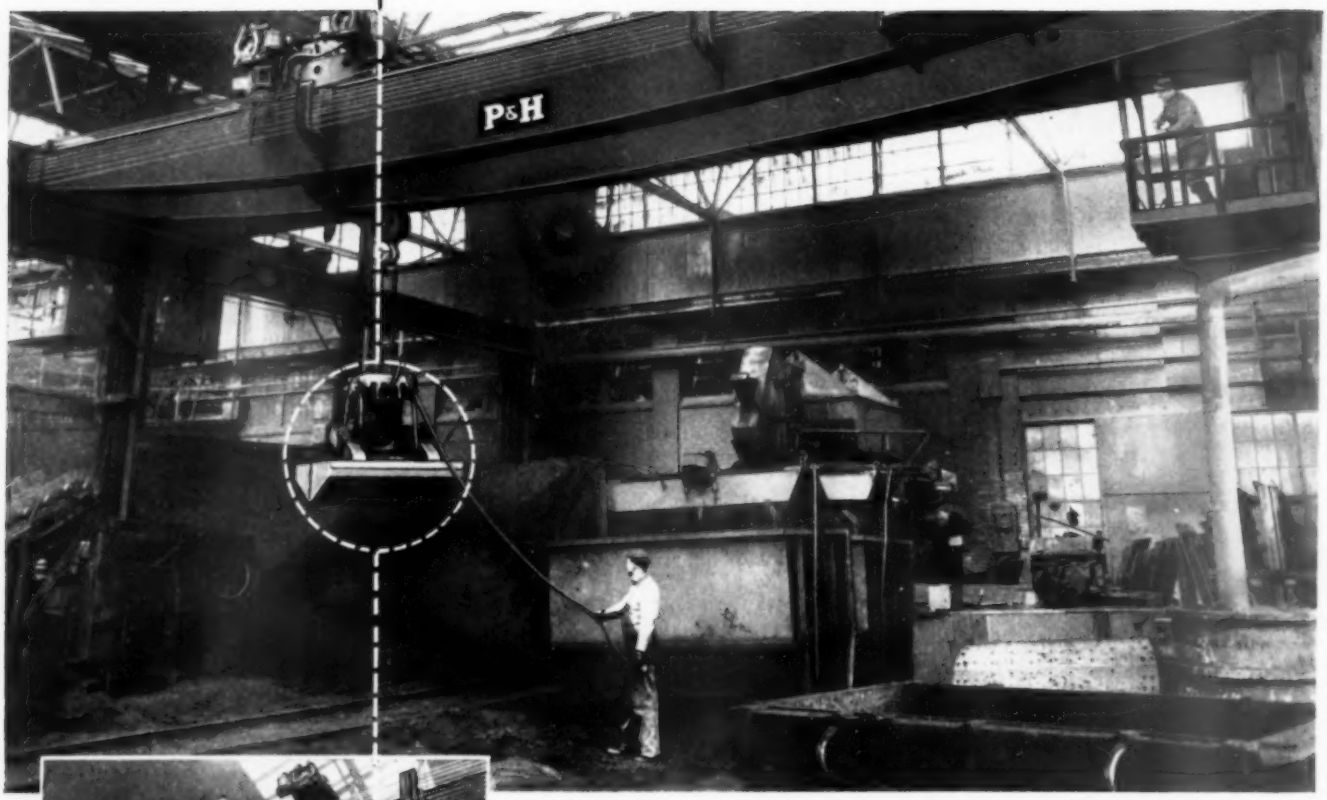
Following through on the work of Thiem's men of research is a sound sales-and-service organization. Your nearby Thiem representative is eager to work *for* you and *with* you in solving your core wash and mold coating problems.

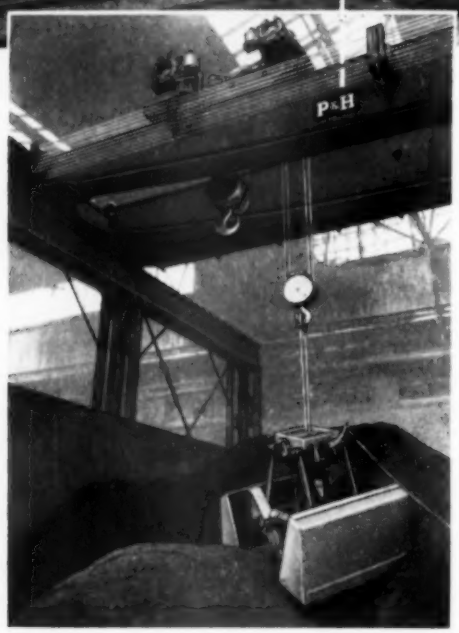
Thiem

PRODUCTS, INC., MILWAUKEE 4, WISCONSIN

KROME KOTE • FERRO KOTE • MOLD LITE • INGOT KOTE • NODRI MOLD SPRAY • FERRO-GLAZE FLUX • CHILL-KOTE • SYNOL • CORE-BINDERS

P&H SINGLE LINE GRAB BUCKETS





a *"Natural"* in foundry service!

In a matter of seconds you can attach the P&H Single Line Grab Bucket to your crane hook and it's ready to go to work. It's as simple as that — and it provides easy, accurate one-man operation. It works fast, bites deep, picks up clean.

Here's the fast, easy way to handle all kinds of bulk materials — sand, coke, crushed stone, cinders, etc. It's widely used to unload cars, dig pits, fill flasks, etc. A "natural" for foundry use if there ever was one.

Available in capacities from ½ to 2½ yds. Write for all the facts about it. Ask for Bulletin C-27.

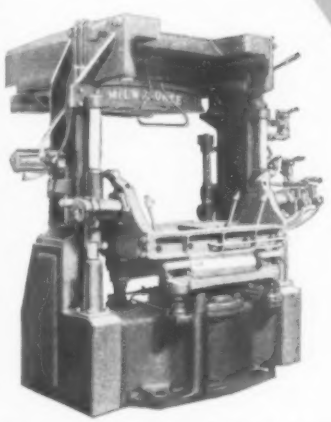
P&H

GRAB BUCKETS
4405 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION
ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

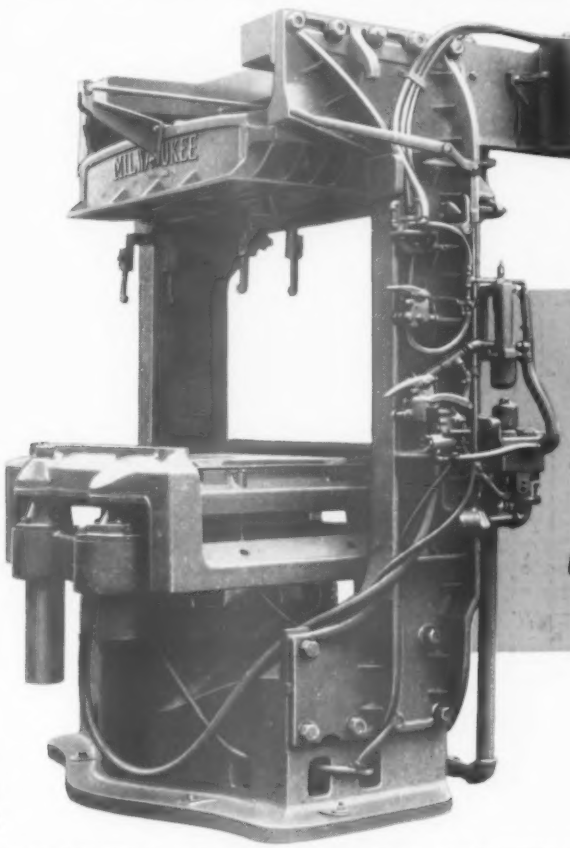
POWER plus!

POWER plus speed and safety are qualities characteristic of MILWAUKEE Foundry Machines. These better molders have a surplus of power and ruggedness due to careful design and precision workmanship. High stresses and strains eliminated by ample design. Unnecessary fatigue and manual effort by operator have also been eliminated. Moving parts are held to a minimum and are easily replaceable. Milwaukee molders give you power to handle large flasks quickly and easily . . . power to stand up under continuous, fast production schedules.



MODEL NO. 307 MILWAUKEE JOLT SQUEEZE ROLLOVER DRAW

A fast molder with automatic leveling and smooth pattern draw. Combines jolt, squeeze, rollover and pattern draw in the simplest possible operating cycle. Assures powerful, accurate, precision performance under continuous, difficult conditions. This model has an 1800 lb. jolting and 50000 lb. squeezing capacity at 80 lbs. line pressure. Handles flasks 47" in width.



MILWAUKEE Car Type JOLT SQUEEZE STRIPPER

Model No. 304

NEW, POWERFUL CAR TYPE JOLT SQUEEZE STRIPPER

The new Model 304 Milwaukee Jolt Squeeze Stripper is constructed to handle extra heavy jobs. Equipped with car-suspended squeeze platen and overhead mold removal, 36" maximum strip frame opening and draw of 12". This stripper has a 3000 lb. jolting and 56000 lb. squeezing capacity at 80 lbs. line pressure. Accommodates flasks with 36" maximum width. Poppet type valve control brings heavy impact against squeeze platen increasing penetration to produce uniform molds with less jolting. Pattern drawing mechanism operates automatically when squeezing pressure is released.

New EASY CREDIT TERMS!

All Milwaukee Foundry Equipment may now be purchased on convenient credit terms. Write for complete details.

MILWAUKEE Foundry Equipment Co.

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

Grind Better

WITH

SIMONDS ABRASIVE CO.

RESINOID BONDED SNAGGING WHEELS

WITH

RED STREAK

PATENT 2,121,656

LESS GRINDING MACHINE WEAR
Better spindle fit (steel against steel) . . . no abrasive wear on machine parts. Red Streak Flanges consist of circular steel flanges or plate embedded and bonded into each side of wheel adjacent to center hole and lining portion of it.

LONGER GRINDING WHEEL LIFE.
Wheel is protected at center hole, safeguarding against damage in mounting and handling . . . preventing chipping sides and edges . . . assuring better balance, truer running.

BETTER GRINDING WHEEL ACTION.
Mount center and flanges keep true and accurate. In manufacturing, the abrasive and bond are mixed and pressed to shape in a single unit, assuring uniformity of entire wheel.

For more snagging production at lower cost, use Simonds wheels with patented Red Streak Flanges. Available with 6, 10 and 12 inch center holes in all popular wheel sizes. See your Simonds Abrasive distributor. Meanwhile send for Red Streak Flange Bulletin ESA-154.

SIMONDS ABRASIVE CO.
Philadelphia, Pa.
Grinding Wheels and Abrasive Products

SIMONDS CANADA ABRASIVE CO. LTD.
Arvida, Quebec
Electric Furnace Abrasives

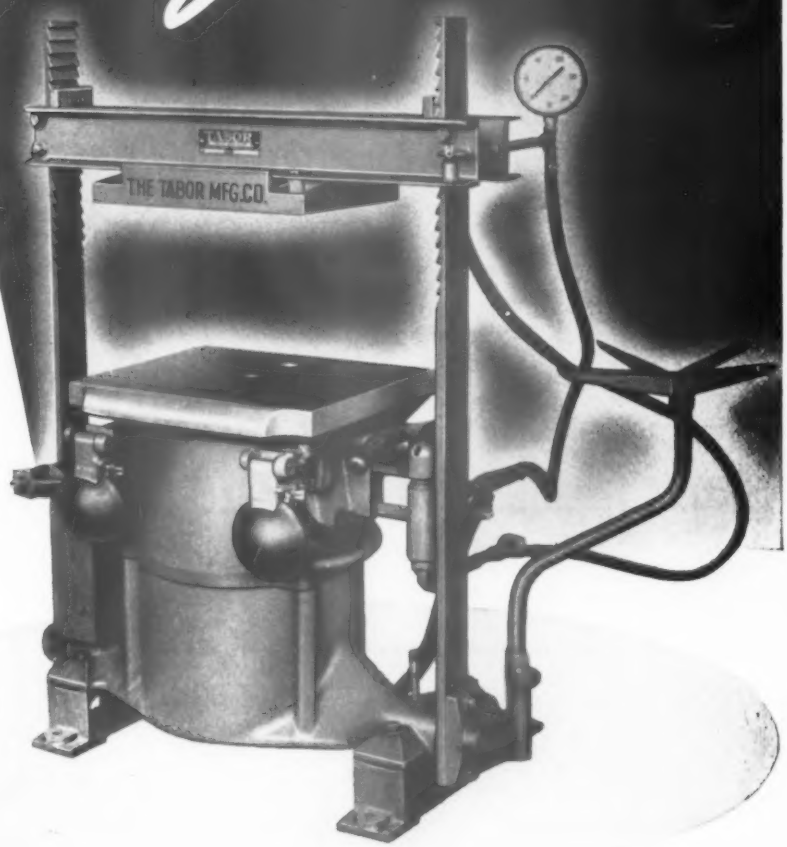
SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

Other Divisions
SIMONDS STEEL MILLS, Lockport, N. Y. — Special Steels
SIMONDS CANADA SAW CO. LTD., Montreal, Can. — Simonds Products for Canada

SIMONDS ABRASIVE COMPANY
PHILADELPHIA 37, PA.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

WANT A *Squeezer* YOU CAN PUT ON THE SPOT?



WE *mean the top-speed, high-production, don't-let-me-down spot!* That calls for a Tabor Yoke-Type Jar Squeezer—the same one you saw at the Tabor booth and in operation with National Engineering Company equipment at the "Philly" Show.

Here's Tabor design at its best, giving foundrymen everything they look for in a Squeezer: steady, uniform squeeze—ease and speed of operation—long life and low upkeep.

Practical design? Just check these five features:

1. Squeezing unit, including guide, is completely enclosed—full protection against dirt and dust.
2. There are no piston rings on the squeeze mechanism—a source of down-time and maintenance expense gone.
3. Wear on squeeze cylinder is so reduced that it won't be necessary, within the conceivable life of the machine, to re-bore or replace this part.
4. It's now impossible, under any circumstances, for the squeeze piston to blow out—a vital safety factor.
5. Entire squeezing or jarring unit may be quickly detached from the machine for easy inspection.

You'll agree there's something good here for you. The machines are in stock. We invite your inquiry.

Diam. Squeeze Cylinder	Table Size	Space Between Uprights
10″	18″ x 20″	32″
13″	18″ x 24″	36″

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, California; Snow & Galgiani, 533 Second St., San Francisco 7, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive St., St. Louis 1, Mo.; E. R. Frost Co., Inc., Minneapolis 14, Minn.

MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

NOW...

precise pouring temperatures almost instantaneously!

. . . with THE NEW FOXBORO DYNALOG ELECTRONIC TEMPERATURE INDICATOR

HERE'S AN INSTRUMENT that you can count on day after day for *exact* temperature measurements of non-ferrous pours. Its unique measuring action balances faster than the thermocouple comes to temperature. This cuts immersion time, and thermocouple replacement, to an absolute minimum.

The first industrial instruments that take full advantage of electronic circuits, Dynalog Instruments have fewer moving parts . . . fewer parts to wear or get out of order. Their unique variable air capacitor provides friction-free, completely stepless balancing, unlimited by slidewire turns, unhampered by slidewire troubles. They require practically no maintenance. No knowledge of electronics required. For speed, accuracy, sensitivity and simplicity combined, they have no equal.

Consider the advantages of the Dynalog Concentric Indicator as a means of getting better castings and greater foundry output. Examine the instrument from every angle . . . performance records . . . convenience . . . service-life. Write for complete information now. *The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.*

HIGH VISIBILITY — large, open-face, easy-to-read concentric scale.

HIGH SENSITIVITY — the result of STEPLESS continuous balancing, unlimited by the turns of a slidewire.

HIGH BALANCING SPEED — only 5 seconds for full scale pointer travel.

HIGH ACCURACY — Calibration accuracy ¼ of 1% of scale for all normal ranges . . . a direct result of the unique capacitor circuit.

FOXBORO
REG. U. S. PAT. OFF.

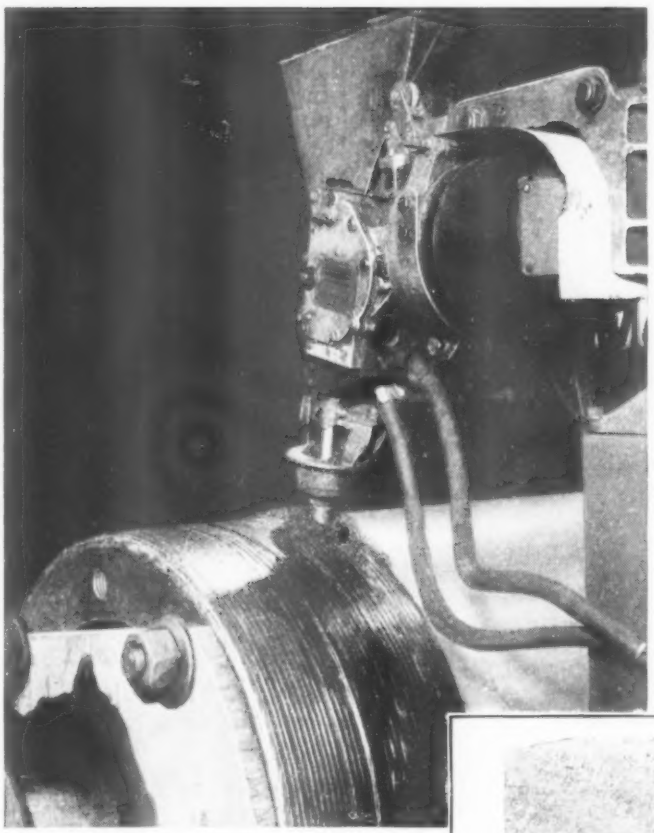
RECORDING · CONTROLLING · INDICATING INSTRUMENTS

Give New Life to Worn Parts

. . . . . *Rebuild Them by the UNIONMELT Welding Process*

This automatic process saves time and money—welding is fast—parts are returned to service quickly—new surface is often superior to original—

Almost any part that can be suitably positioned can be rebuilt by the UNIONMELT welding process. It has been used successfully on parts such as steel mill rolls, guides, mandrels, journals; wheels for locomotive cars and cranes; pipe molds, and press plungers and cylinders.



Rebuilding a 21 in. diameter press plunger.

Deposits of almost any thickness can be made of—

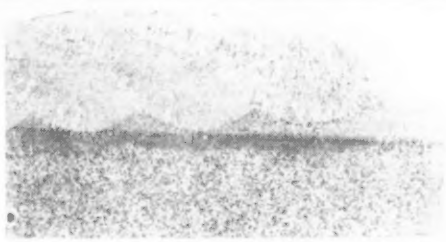
High carbon, flame-hardenable steels

Wear-resistant and hard-facing materials

Corrosion- and heat-resistant steels

With the UNIONMELT electric welding process clean, dense, uniform weld metal can be deposited at the highest known welding speeds. There is no glare, flash, or spatter during welding. If a finished surface is needed, only minimum machining is required because of the smoothness of the weld deposit.

There are many LINDE methods of joining, rebuilding, forming, cutting and treating metals. LINDE Engineering Service can help you in production, construction, and maintenance. Just call the nearest LINDE office.



A flat surface is produced by offsetting each bead.

Linde
Trade-Mark

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

General Office: New York, N. Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The words "Linde" and "Unionmelt" are registered trade-marks of The Linde Air Products Company

Baldwin Watches Pouring Temperatures

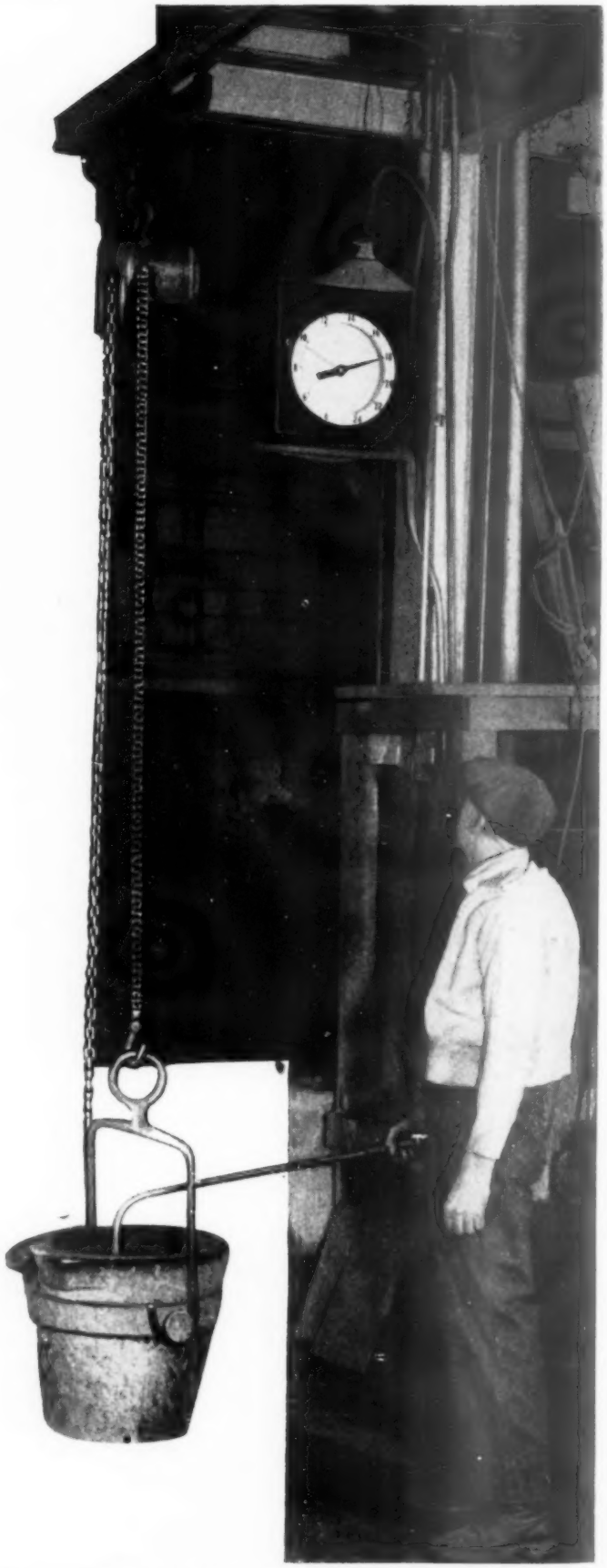
Every foundryman knows that correct pouring temperature means better castings and increased production. In the foundries of the Baldwin Locomotive Works measuring these important temperatures has been made easy by a number of Brown *ElectroniK* Pyrometer installations.

The Brown system makes use of the *ElectroniK* indicating and recording instrument and a portable molten metal thermocouple. To make a measurement, the thermocouple is immersed several inches below the surface of the metal in the ladle. The instrument pointer then swings to the proper reading, which is readily visible on the large 28" scale. The chart record is evidence of the stabilized reading. The entire measuring operation requires less than a minute of time.

The complete system for pouring temperature measurement has been field proved in many foundries where its use has resulted in increased production of higher quality castings, and longer furnace life. It will bring you all the advantages of uniform temperatures with the speed and convenience necessary in modern foundry operations. For complete information write for Data Sheet 5.4-2 and Catalog 15-13.

THE BROWN INSTRUMENT COMPANY, 4420 WAYNE AVE. PHILADELPHIA 44, PA.
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

Offices in principal cities of the United States, Canada and throughout the world.



One of the Brown *ElectroniK* Pyrometer installations at The Baldwin Locomotive Works. The elevated location of the instrument permits an unobstructed view from any position on the floor.

BROWN *Advanced Instrumentation* FOR BETTER PROCESSING

Product of MINNEAPOLIS Honeywell

SANDCUTTER will give you

Uniform Sand Conditioning

SANDCUTTER cuts through every foot of sand at least 100 times. Water and new sand are uniformly blended-in. Dry spots, wet spots, lumps and pockets of new sand cannot escape the churning action of the cutting cylinder.

Simple Operation By One Man

SANDCUTTER is easily operated by only one man. With a Sandcutter he can cut a floor of sand in far less time than is possible for several men by hand shoveling.

Cutting and Piling

SANDCUTTER goes right to the molding floors; the sand does not have to be carried to it. Sandcutter travels up and down the floors, cutting and piling in record time.

Aerating and Cooling

SANDCUTTER'S whirling blades thoroughly mix, aerate and cool the sand as they throw it backward into the air and toss it from side to side. The tempered sand, free from all steam and gases, is loose, soft, fluffy and cool.

Sand Prepared To Your Requirements

SANDCUTTER conditions the sand in accordance with individual requirements for moisture, bond and permeability. Sand conditioned by a Sandcutter riddles fast, rams easily and vents perfectly.

No Hand Shoveling

SANDCUTTER eliminates drudgery, conserves labor, and does a more thorough conditioning job in far less time and at much lower cost.

WRITE FOR COMPLETE CATALOG

The "American Line" catalog illustrates and describes every Sandcutter Model as well as all other American products. Send for your free copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St., Mishawaka 2, Indiana

Sandcutters

1 MINUTE QUIZ *for product engineers*

QUESTION 1

Which of the following maximum tensile strength figures can now be consistently obtained in Gray Iron as cast?

A. 20,000 p.s.i. B. 30,000 p.s.i. C. 40,000 p.s.i.
D. 50,000 p.s.i. E. 60,000 p.s.i.

QUESTION 2

Which of the following has the greatest Damping Capacity?

A. Forged Steel B. Cast Steel C. Malleable Iron
D. Gray Iron E. Wrought Steel

QUESTION 3

How many pounds of Gray Iron components were produced last year for each ton of finished rolled steel products?

A. 400 lbs. B. 300 lbs. C. 200 lbs.
D. 100 lbs.

QUESTION 4

Which product is least notch-sensitive?

A. Wrought Steel B. Gray Iron C. Forged Steel
D. Cast Steel E. Malleable Iron

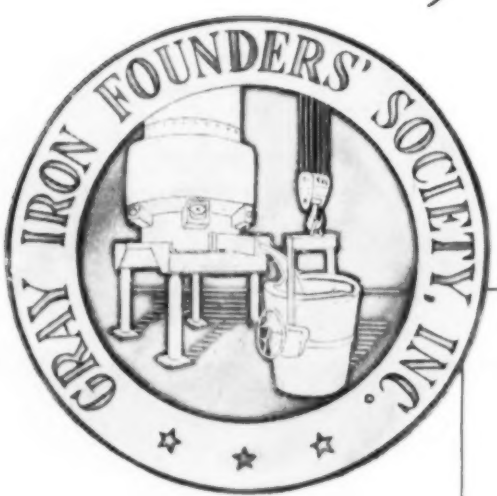
QUESTION 5

What percentage of all cast products (ferrous and non-ferrous) produced in the U. S. last year was Gray Iron?

A. 38% B. 48% C. 58%
D. 68% E. 78%

ANSWERS:

	5. E	
3. A	4. B	
1. E	2. D	



GRAY IRON FOUNDERS' SOCIETY, INC. *33 PUBLIC SQUARE CLEVELAND 13, OHIO*

"make it better with gray iron"

Fuel oil users:

YOU CAN NOW CLEAN SLUDGE OUT OF YOUR OIL SYSTEM *and actually burn it!*

Just add HOUGHTO-SOLV to your oil!

Here is a proven boon to fuel oil users who have sludged systems—an economical additive you pour in the fuel oil tank, which speedily removes deposits from tanks, burners, nozzles, strainers and tips.

No more need for costly hand cleaning of heating systems. Pumps and parts are cleaned up, stay clean. Steady efficient heating is assured.

HOUGHTO-SOLV is supplied in 55-gal., 30-gal. or 5-gal. containers, and added to the fuel oil in the amount of one quart to 1,000 gallons. It's safe, non-corrosive, easy to use, lower in cost and more effective than former types of additives. Write for circular and prices.

E. F. HOUGHTON & Co.

303 W. Lehigh Ave., Philadelphia 33, Pa.

Stocks carried also in Chicago, Cleveland, Detroit and San Francisco

ESTABLISHED 1865

"MEASURING UP"...

from every angle

There's no chance of misfits in International graphite electrodes and nipples. They are checked chemically and mechanically, for top-quality and constant uniformity.

Carbon and binder ratios are constantly tested to assure highest degree of purity. Baking and graphitizing cycles are carefully controlled to produce a high grade product. Threads, ID and OD, circumferences and lengths are put to caliper and micrometer examinations. If they don't "measure up"—you don't get them.

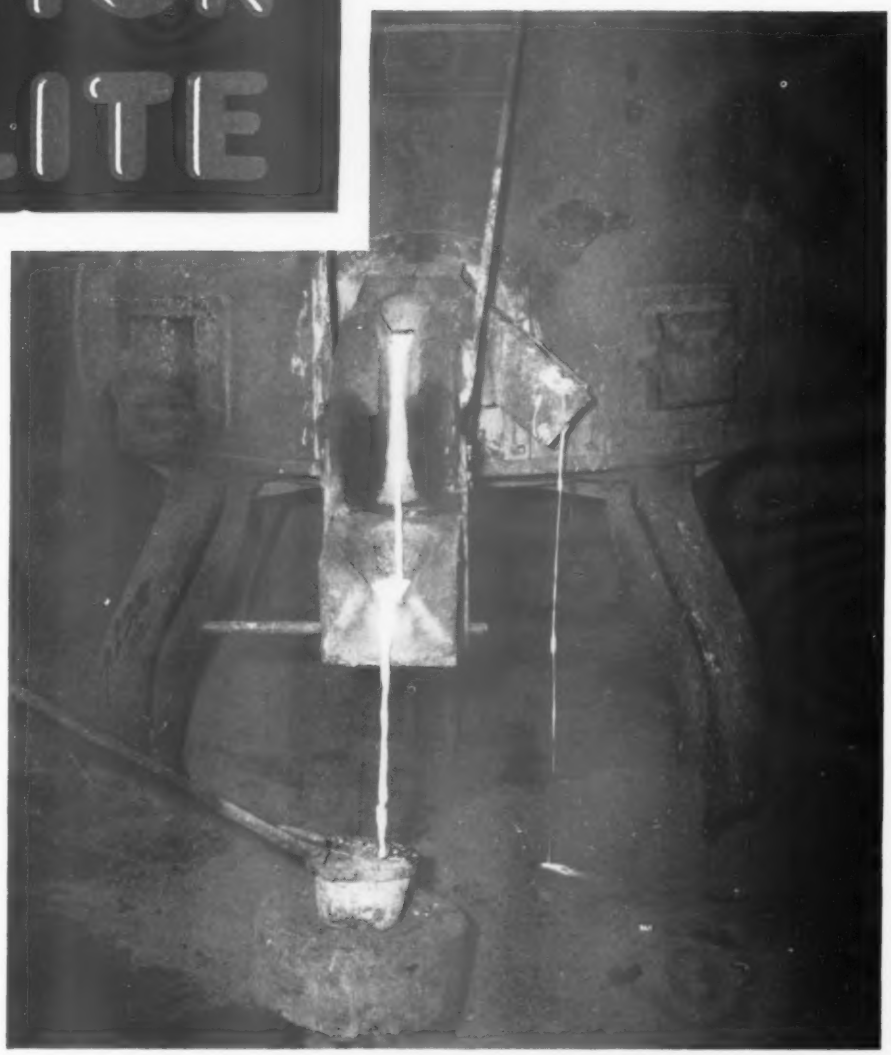
Now International graphite electrodes come to you in palletized shipments that mean time and money savings in unloading boxcars and gondolas. Write today for a free copy of the Graphite Engineering Data Book.

ICE

International Graphite & Electrode Corp.

SAINT MARYS, PA

IRONTON BERLITE



"IRONTON"

Foundry Representatives

The Ironton Fire Brick Company
Ironton, Ohio

The Ironton Fire Brick Company
Box 4728
Jacksonville 1, Florida

Beeman Sales & Engr. Company
629 Buhl Building
Detroit 26, Michigan

Earl A. Swenson
Box 651
Columbus 16, Ohio

Firegan Sales Company
Board of Trade Building
Chicago 4, Illinois

Henry M. Witmyer
2301 N. Charles Street
Baltimore, Maryland

Pa. Foundry Supply & Sand Co.
Ashland & East Lewis Streets
Philadelphia 24, Pennsylvania

M. D. Lucas
7016 Euclid Avenue
Cleveland 3, Ohio

Frederic B. Stevens, Inc.
93 Stone Street
Buffalo 12, N. Y.

Carl F. Miller & Co., Inc.
1217 Sixth Avenue, South
Seattle 4, Washington

Klein-Farris Co., Inc.
683 Atlantic Avenue
Boston 11, Mass.

Interstate Supply & Equip. Co.
647 W. Virginia Street
Milwaukee 4, Wisconsin

Is poor quality coke and inferior scrap causing you trouble with your cupola blocks in the well and melting zone? If so, please write to us and we will be glad to tell you how to overcome it with "Ironton Berlite", super-quality refractory material.

"Ironton Berlite" is also giving remarkably good service as a ladle lining material, as a rammed tap hole, and for front slagging spouts.

There is no substitute for "Ironton Berlite".

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

You wouldn't hire 5 men to do the work of 4 . . .

A-C DOES IT FASTER • CHEAPER • BETTER

FASTER: Ease in using heavier electrodes with higher currents, and the ability to make excellent welds in all positions, assure higher speeds on all classes of work.

CHEAPER: "No-load" losses approximate 15% of d-c; pays for itself in power savings. 85% to 90% electrical efficiency as compared to 55% to 65% for d-c machines.

BETTER: Westinghouse A-C Welders eliminate magnetic arc blow—reduce spatter loss—permit welding of heavier sections—assure easy arc control and sounder welds.

WESTINGHOUSE

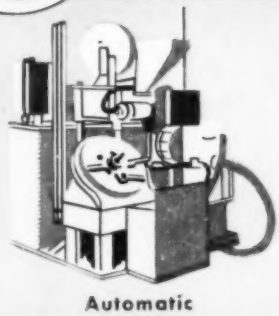
FOR SUPERIOR WELDING FLEXARC

Westinghouse

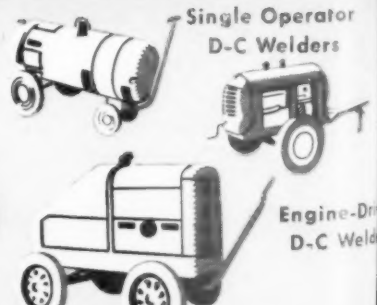
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Manual Type A-C Welders
HC, WC-AC, WT-4, Farm Welder

1000 Amp
A-C Welder



Automatic
Welding Equipment



Single Operator
D-C Welders

Engine-Dr
D-C Weld

WHEN YOU SELECT AN A-C WELDER

...GET THE RIGHT WELDER WITH THE CORRECT RATING

You wouldn't buy a 500-hp motor to do a 400-hp job. When you switch from d-c to a-c welding, you don't have to buy a 500-ampere a-c welder to replace a 400-ampere d-c machine.

Westinghouse offers a complete line of a-c welders . . . from the smallest to the largest. Each type and size is built to perform in accordance with its rating. For example, the Westinghouse Flexarc "65" 400-ampere A-C Welder is ample to do any job previously performed by a 400-ampere d-c unit. Ampere for ampere, it delivers rated output accurately, continuously . . . and, furthermore, it does this *faster, cheaper and better.*

With Flexarc A-C Welders, you can be sure of rated output in every instance . . . and you can get a rating to suit the job.

THE FLEXARC "65" GIVES YOU LOW VOLTAGE AND ARC STABILITY

The Flexarc "65" is the new *low-voltage* a-c welder with the *stabilized* arc. It's built to operate with an open-circuit secondary voltage of only 65 volts, and overcomes the problems of arc instability which formerly limited the use of lower a-c voltages for welding. It provides uniform, continuous current adjustment. Arc stability is assured over the entire operating range of welding current.

Flexarc "65" Welders are available in 200, 300, 400, 500 and 600-ampere ratings. For full details, see your nearby Westinghouse representative, or mail the handy coupon below. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21452

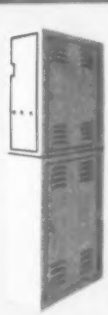
EVERYTHING for Welding ANYTHING!

gh-Frequency Stabilizers

Portable and Bench-Type Brazers

Electrodes, Brazing Alloys Arc Torch and Accessories

Resistance Welding Control



MAIL THIS COUPON

Westinghouse Electric Corporation
P. O. Box 868, Pittsburgh 30, Penna.

YES—send me details on the new Westinghouse "65" A-C Welder—also on items checked.

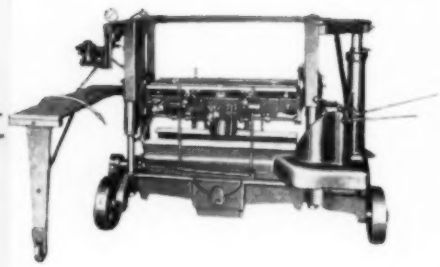
- ☐ Automatic Welding Equipment
- ☐ Engine-driven Welders
- ☐ HF Stabilizers
- ☐ Brazers
- ☐ Electrodes
- ☐ Resistance Welding Control
- ☐ D-C Welders

Name _____

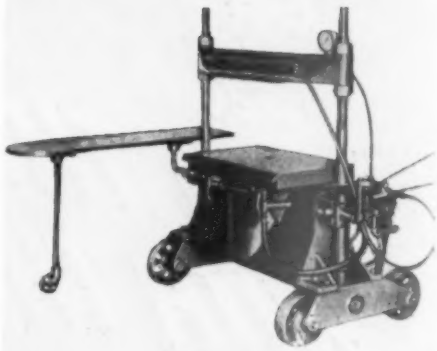
Company _____

Address _____

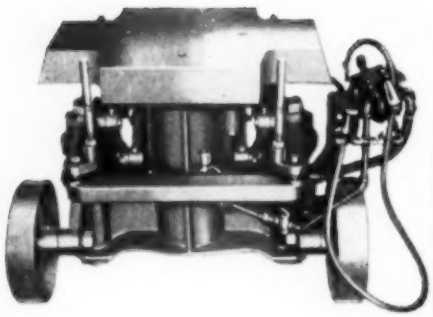
Jolt Squeezer—Arm type
5 sizes



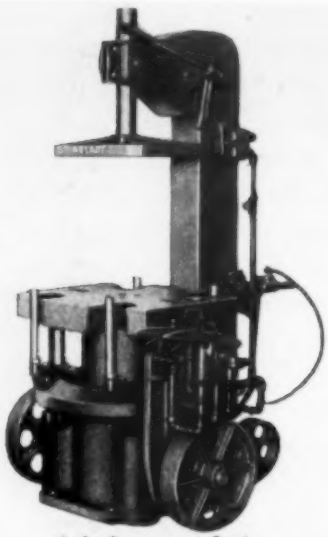
Jolt Rollover Squeeze Draw
4 sizes



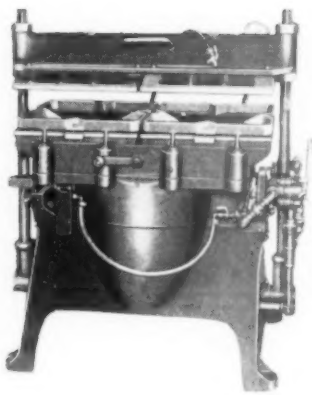
Jolt Squeezer—Strain rod type
2 sizes



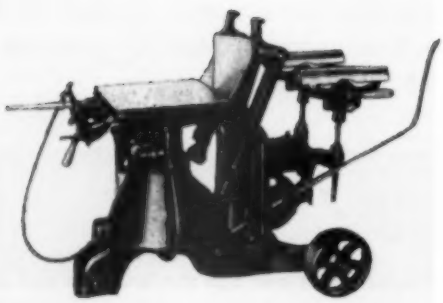
Jolt Pin Lift
3 sizes



Jolt Squeeze Strip
4 sizes



Multiple Molding
3 sizes



Jolt Rollover Draw
3 sizes

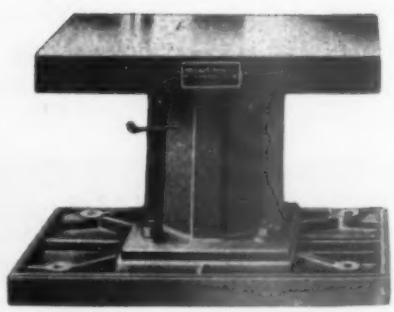
8 Good Ways to
CUT MOLDING COSTS

Here's a molding crew that knows its business—these eight veteran shock troopers proved in the incessant war against lagging production and climbing costs.

You can expect "good news for foundries" regularly from Arcade. Meanwhile send for bulletins.

ARCADE

MANUFACTURING DIVISION
ROCKWELL MANUFACTURING CO.
FREEPORT, ILLINOIS



Plain Jolt
6 sizes

Foundrymen Win Stay In Pig Iron Squeeze

AFTER a ten-day performance of the Republic-Kaiser-Frazer-War Assets Administration Follies in the heat of late August when both temperatures and tempers reached the boiling point, the show suddenly closed. From all appearances, foundries will continue to receive pig iron "without interruption" until next May. At least until after the election, the heat is off a number of bureaucrats.

In any appraisal of the entire affair, two interesting points are apparent. First of all, the mess never should have been allowed to happen. Continuous operation of this blast furnace and movement of pig iron to the 400-odd foundry customers of Republic in nineteen states has such a far-reaching effect on so many industrial plants that any change in the operating pattern should have had careful consideration before action was taken. Public knowledge of negotiations would have permitted protests before the deal was closed.

Of even greater significance is the fact that foundrymen led the fight to protect the pig iron supply, and that they won this first round in the battle of giants. The *Cleveland Plain Dealer* summed up the situation as follows: "The concerted howls from hundreds of foundrymen and other users of Republic pig iron was conceded to be a major incentive for reaching a compromise."

How did this all happen? Undoubtedly success was achieved because organizations were available to perform a much needed service for the industry.

When the leasing of the furnace was announced and foundries were notified that the pig iron supply would be cut off at the end of August, the Gray Iron Founders' Society moved at once to organize a protest meeting under the leadership of Henry J. Trenkamp, president, Ohio Foundry Co., and chairman of the Northern Ohio Management Group of the society, Raymond L. Collier, executive vice president of the society, James Mitchell, president, Cleveland Foundry Co., and others. The society publicized the plight of the foundries.

As a result of these efforts, a well organized meeting was held in Cleveland with 200 present. Foundrymen, labor leaders and users of castings all told the same story of trouble to come, and resolutions were adopted protesting the action that had been taken by WAA. These were presented along with testimony of numerous foundrymen before the Senate hearing in Washington and had an important effect in highlighting the threatened dislocations to the industrial economy. Protests also were registered by the Malleable Founders' Society, Inter-Allied Foundries of New York and many individual companies.

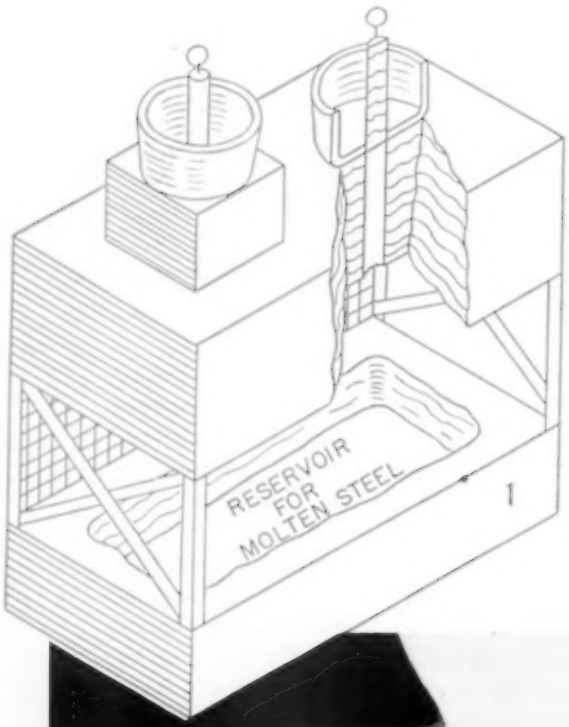
After all the fireworks, assurance of a continued supply of pig iron for some months to come again emphasizes the importance of having strong trade associations ready to protect the industry when these frequent emergencies arise. Such organizations should have the continued support of every company in the particular industry.

Frank G. Steinebach

Editor

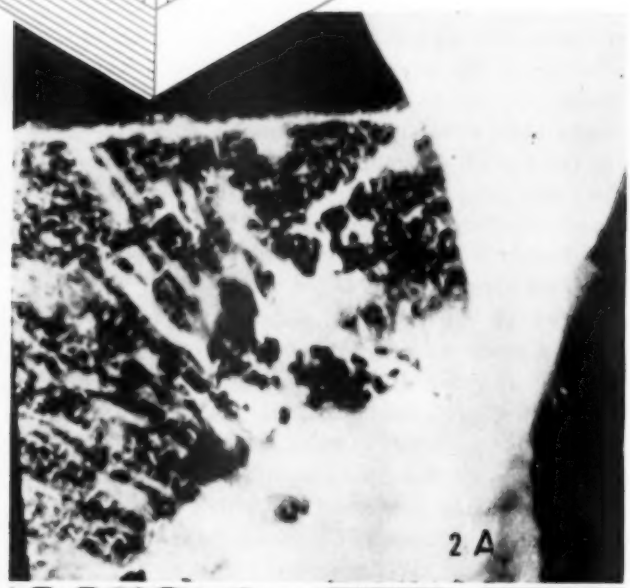
THE FOUNDRY—WHEREVER METALS ARE CAST

Gating



THE investigation described here was undertaken to observe the effects of gate design on the flow and turbulence of liquid steel as a casting is poured. Gating systems and pouring techniques such as top pouring, whirl gates, riser gates, finger gates, horn gates, step gates and bottom side gates were studied. The results showed that many gating systems do not function as commonly supposed. The behavior of each system is described in the text.

To observe the discharge of molten steel into the mold cavities use was made of motion pictures. High-speed photography, at one thousand frames per second, was used in a study of flow of molten steel through sprues. The most interesting scenes of flow and turbulence produced by the various gating systems have been assembled into a 16-mm. sound film.



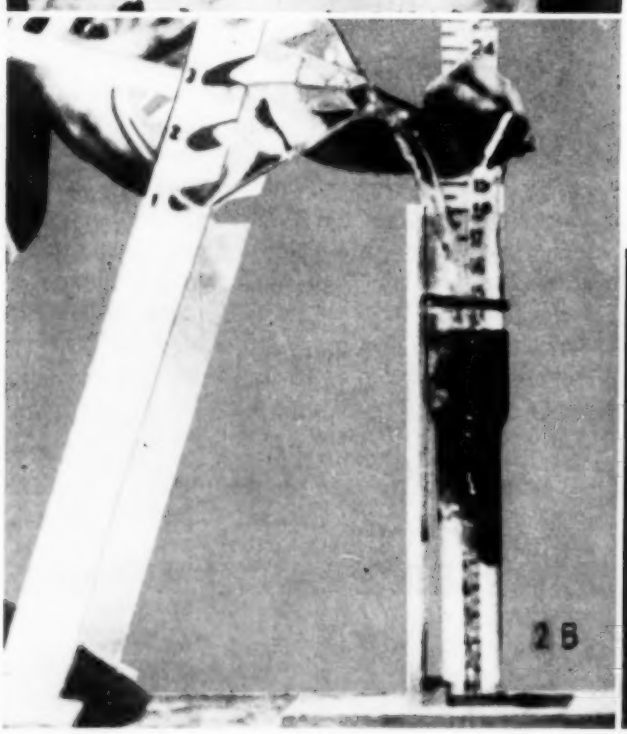
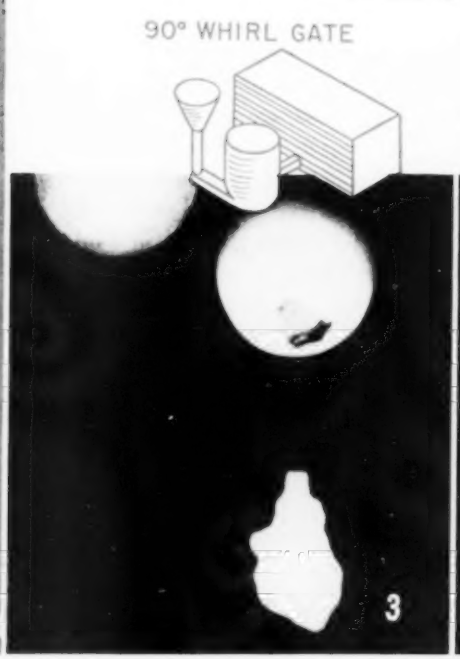


Fig. 1—Unattached sprues used for high-speed photographic studies of metal streams

Fig. 2A—Top pouring molten metal into mold develops considerable turbulence, as further shown by water-in-glass model (Fig. 2B)

Fig. 3—Metal poured at 3000° F in whirl gate having ingate at 90-degree angle to runner

Fig. 4—Ingate is at 180-degree angle to runner in this whirl gate



By WILLIAM H. JOHNSON
and WILLIAM O. BAKER
U. S. Naval Research Laboratory
Washington

Systems For Metal Casting

FOUNDRY techniques for gating molten metals into molds are generally developed by trial and error methods. The need for the study of the behavior of molten metal within gating systems is widely recognized. Most of the information on fluid flow which is available in the literature is concerned with steady flow conditions and little can be applied to the filling of a mold.

Studies of flow in models of gating systems have been reported by S. L. Fry[1] and by R. B. Fisher[2]. Fry recorded the behavior of the low melting nonferrous metals lead and aluminum by cine-radiography. He placed plate molds between an x-ray source and a fluorescent screen and photographed the image with a 35-mm cine camera. Fisher poured Wood's metal at 250° C into molds faced with transparent lucite and photographed the flowing metal through the lucite with a 16-mm cine camera. His work dealt with the flow characteristics produced by various designs of gates and different rates of pouring.

In our experiments molten steel at 3000° F was poured by means of various gating systems into open mold cavities. From directly over the mold 16-mm Kodachrome motion pictures at 64 frames per second recorded the flow and appearance of the metal. Studies were made of top pouring, whirl gates, riser gates, finger gates, horn gates, step gates and bottom side gates. Several variations were used for each of these gating systems.

The sprues and ingates in all gating systems were 1 in. in diameter except where a deviation from this dimension is noted below. In the studies of top pouring, and of step and bottom side gates, a casting 5 x 5 in. square x 18 in. high was used with a riser 7 x 7 x 7 in. Whirl gates, riser gates, finger gates, horn gates and other step gates were used on a 6 x 6 x 12 in. casting without a riser. This mold was placed in a horizontal position except in the case of step gating when it was vertical.

Turbulence in the castings was revealed by the swirling and rolling of the molten metal in the mold. This was best observed and was of most interest in finger gating systems. When the combined area of the fingers entering the mold was twice that of the sprue area, a swirling turbulence occurred; when the areas were equal, a rolling turbulence was observed. Swirling turbulence was identified by a clockwise or counterclockwise movement, or even both, on the surface of the metal in the mold. The axis of rotation was vertical and perpendicular to the plane of the

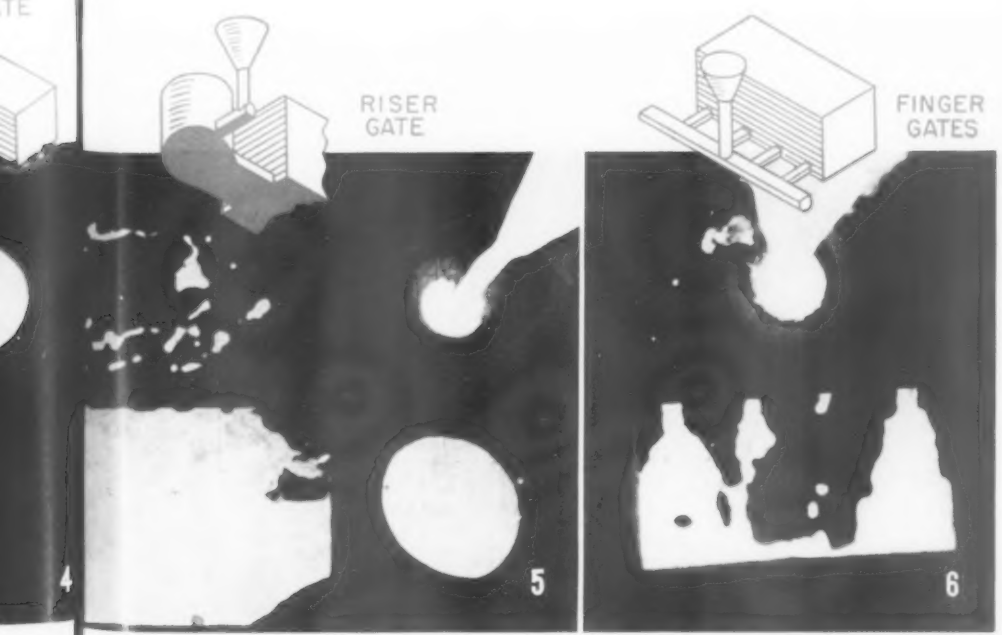
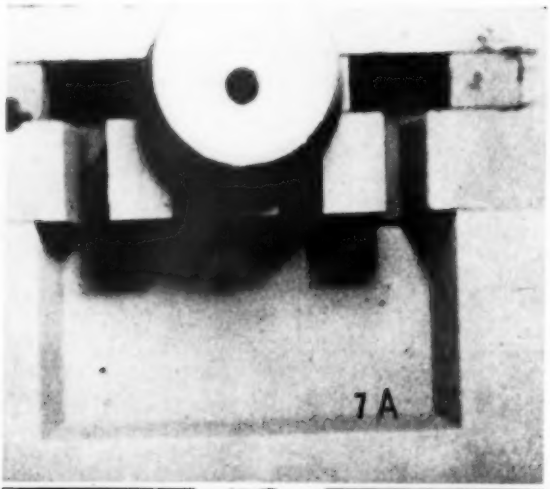
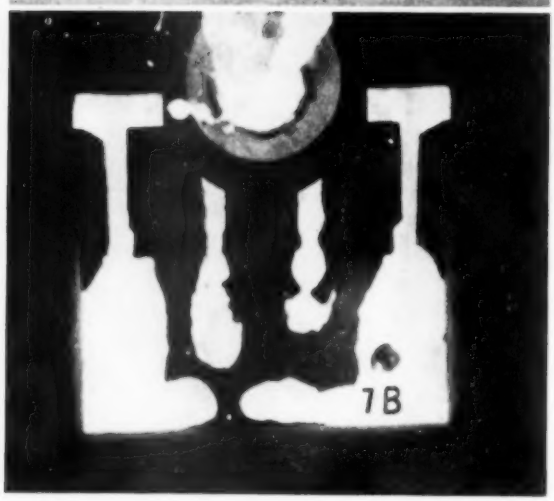


Fig. 5—Riser gate on horizontal mold poured at 3000° F delivered metal at lower velocity than the whirl gates, but turbulence was still present

Fig. 6—Total area of these finger gates was twice that of the sprue. Most of the metal entered the casting through fingers farthest from the sprue





Gating Systems

fingers. This form of turbulence was produced by unequal feeding through the several fingers.

Rolling turbulence was characterized by a uniform flow on the surface of the metal from one side to the opposite. Its axis of rotation was parallel to the plane of the fingers and to the runner. This type of turbulence was associated with approximately equal feeding from each of the fingers.

In order to examine the effects of variations in reservoir level and in slag elimination with open sprue cups, some comparative runs were made with plugged sprue cups. The appearance of the stream emerging from a sprue without a runner was photographed. The mold arrangement used for these studies is shown in Fig. 1. The stream from an open cup when photographed at 1000 frames per second and projected at 24 frames appeared very turbulent for some time after pouring started, but later became steadier and streamlined. The flow from a plugged sprue cup at high-speed photography appeared to be streamlined during the entire pouring time, although there was frequent variation in cross section of the stream. A plugged sprue cup appeared to increase the constancy of metal flow when compared with open cup behavior.

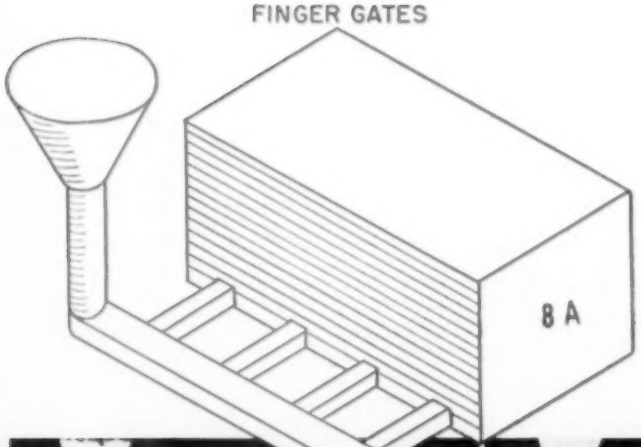
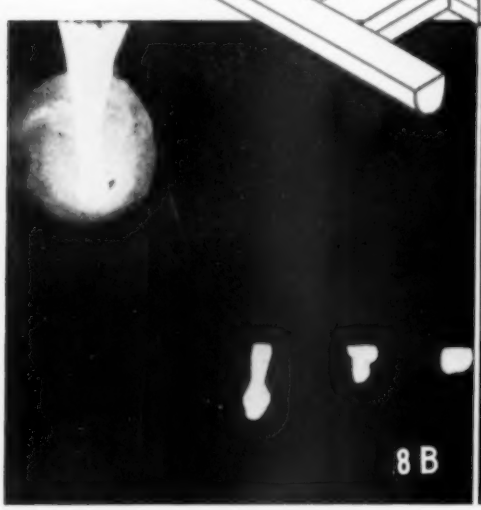


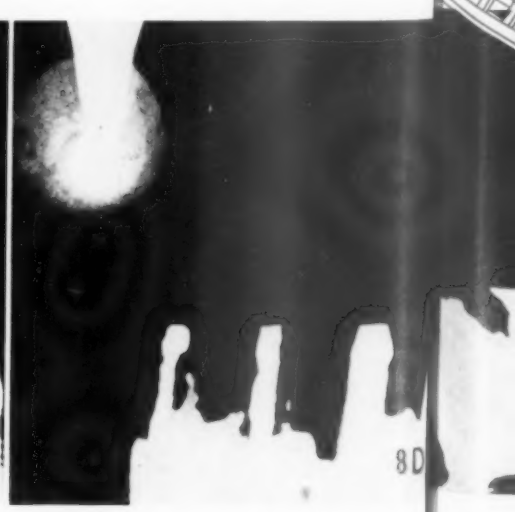
Fig. 7A—Cope removed for better observation of metal flow in finger gates. When pouring first started (Fig. 7B) metal flowed past nearest gate openings to ends of runner

Fig. 8A—Finger gates with sprue at end. Second finger from sprue fed first (Fig. 8B), but most metal entered the casting through finger farthest from sprue (Figs. 8C and 8D)

Fig. 9—When angle between fingers and casting was changed to 30 degrees the finger farthest from the sprue fed first

Fig. 10—With total finger area equal to sprue area, metal flow began at farthest fingers but soon became uniform. Shifting sprue to end of runner (Fig. 11) introduced metal into nearest fingers first but uniform flow resulted shortly thereafter





The results observed with the different methods of pouring and different types of gating systems are described below.

Top Pouring—Although direct pouring of molten metal into the top of a mold, as shown in Fig. 2A, is not commonly used in the foundry industry, steel ingots are cast by this method. Severe spattering occurred immediately and continued throughout the pouring cycle. Considerable turbulence was noted. A water-in-glass model, Fig. 2B, showed that even when the model was nearly full, approximately two-thirds of the liquid was agitated by the entering stream. This phenomenon has also been observed by Northcott[3] and other investigators.

Whirl Gating—A whirl gate receives its name from the rotation which it imparts to the liquid metal in it. Separation of slag from metal by centrifugal force is an intended objective. In the two variations of whirl gates studied, the runner and ingate always had the same cross-sectional area and were in the same plane, but the angle of the runner was varied with respect to that of the ingate.

In that first variation, Fig. 3, the ingate was at an angle of 90 degrees to the runner. The metal ran through the gate into the casting before the bottom of the gate was completely covered, and some slag entered the mold. Later, when the whirl became fully developed, slag appeared to be completely separated. In the second variation of this gate, Fig. 4, the ingate was at an angle of 180 degrees to the runner. Again, metal entered the mold before the bottom of the gate was completely covered and in this stage some slag escaped into the mold. Swirls indicating turbulence were apparent on the molten steel in the mold with both designs of gate.

Riser Gating—A riser gate differs from a whirl gate only in having a larger ingate, allowing it to function as a riser when pouring stops. Fig. 5 shows a horizontal mold with a riser gate. This gate delivered metal at lower velocity than the whirl gates, but turbulence was still present in the casting. An interesting phenomena noticed with this system consisted of frequent changes in light intensity on the metal's surface during and after pouring. The cause of these "flashes" is not known at present, but they will be referred to again in describing other gating systems.

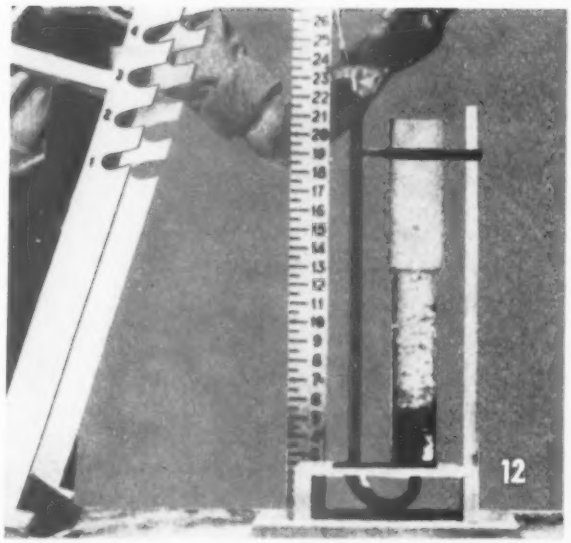
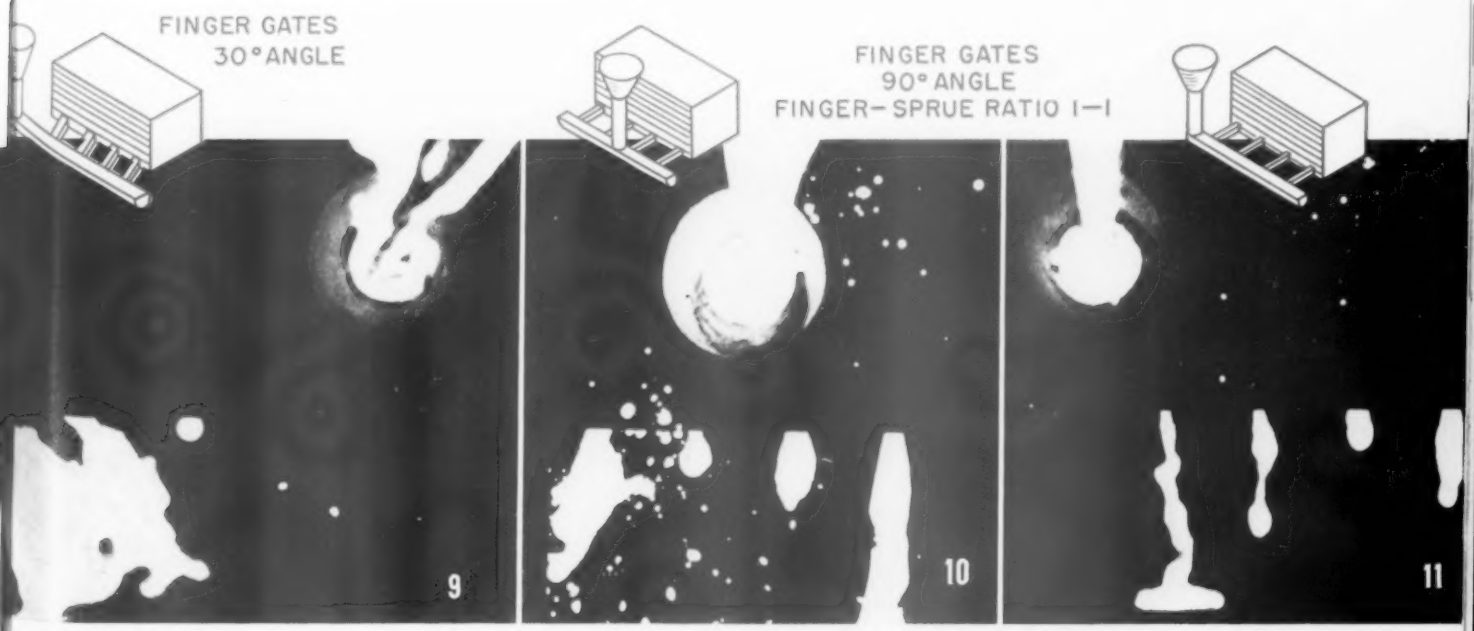


Fig. 12—Model of normal horn gate indicates that a single gate produces fountain-like jet and severe rocking of metal in the mold

Finger Gating—Finger, or pencil gates, are employed to distribute metal into the mold in a horizontal plane over a large area. The number of fingers, their positions relative to the sprue and the angle of entering the mold were factors studied. Arrangements of four finger gates of equal size in which the total finger area was twice that of the sprue were studied first. Most of the molten metal, Fig. 6, entered the casting through the fingers farthest from the sprue. This continued after the mold became full as shown by the opposing swirls on the surface of the steel.

For better observation of the movement of the steel in the fingers, the cope of the mold was removed,



Gating Systems

Figs. 7A and 7B. When pouring first started, the metal flowed past the nearest gate openings to the ends of the runner. After sufficient metal had entered to cause a build-up of metal at each end of the runner, the outer fingers began to feed. Flow continued primarily through the outer fingers as long as constant pressure was maintained in the system by continued pouring. It was observed here, and throughout this investigation, that once a flow pattern was established in a gating system, it was difficult to change it.

The location of the sprue was next changed from center to end of the series of four fingers, Figs. 8A through 8D, with no change in the area ratio and finger angle. The second finger from the sprue fed first, as shown in Fig. 8B, but most of the metal entered the casting through the finger farthest from the sprue, Figs. 8C and 8D. Swirling turbulence became apparent in the side of the mold opposite the sprue. This disturbance lessened as the mold filled and back flow from fingers became more uniform.

With a change in the angle between the fingers and the casting to 30 degrees, or 150 degrees to the direction of flow of metal in the runner, as in Fig. 9 the finger farthest from the sprue fed first.

The effect of reducing the total finger area to equal that of the sprue was next investigated. Although the initial flow began from the fingers farthest from the sprue, Fig. 10, flow from all the fingers soon became more uniform. A rolling type of turbulence replaced the swirling kind of turbulence noted previously with the larger finger-to-sprue ratio. When the location of the sprue was shifted from the center to the end of the runner, molten steel entered first through the fingers nearest the sprue, Fig. 11, but shortly thereafter flow from all fingers became relatively uniform and rolling turbulence occurred. When an additional change of finger angle to mold of 30 degrees was made, flow began at about the same time through all four fingers, with the farthest ones carrying the greater quantity of metal. The amount of flow became fairly uniform at a later stage.

This investigation of finger gating indicated that when the combined finger area was greater than that of the sprue, feeding was not uniform and swirling turbulence was the result. When, however, the combined finger area equaled that of the sprue, feeding was relatively uniform but was accompanied by a rolling turbulence.

Horn Gating—Horn gates are designed for use on castings which cannot be gated on the edge or where

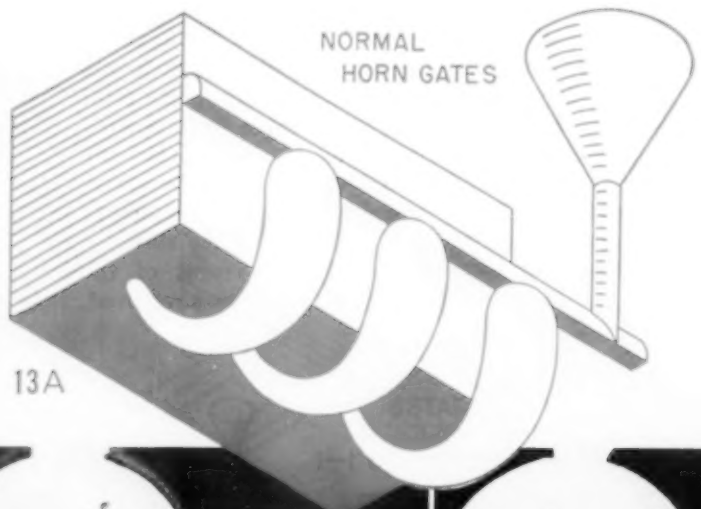
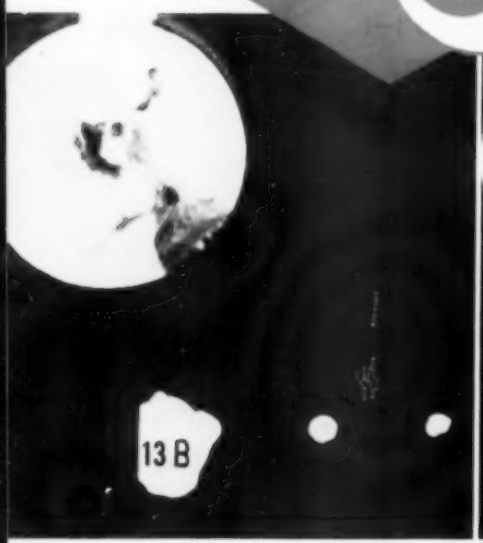


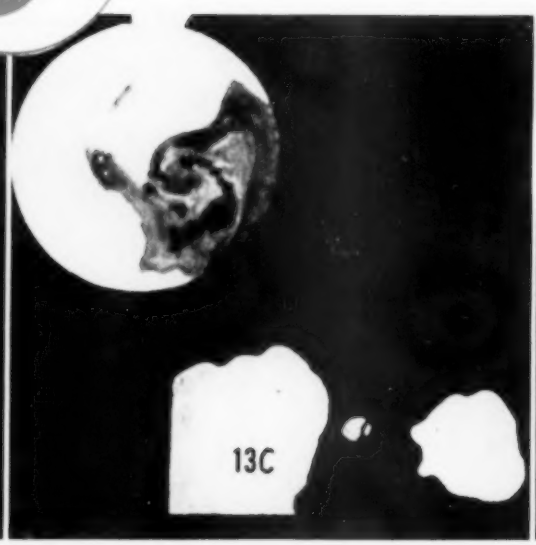
Fig. 13A—Normal horn gates having 6.5-in. span, 2-in. diameter at runner, 1-in. diameter at casting. Sprue diameter 1 in. Poured metal first entered horn next to sprue (Fig. 13B). Later most metal entered horn farthest from sprue (Fig. 13C). Middle horn began to feed after mold was partially filled (Fig. 13D)

Fig. 14—Reversed horn gates with sprue at one end. Horn farthest from sprue delivered most of the metal

Fig. 15—Placing sprue at center of reversed horn gates caused horns farthest from sprue to do all the feeding

Fig. 16—In this bottom side gate, metal entered the mold more evenly than through any other studied





it is not considered advisable to pour metal down through a gate on the top. A normal horn gate is smaller in cross section at the casting than at the down gate, and a reversed horn gate is tapered in the opposite direction. A single normal horn gate produced a fountain-like jet and severe rocking of the metal in the mold. The height of this initial fountain-like jet was more apparent in a water-in-glass model. Dye introduced into the pouring stream when the model was nearly filled, Fig. 12, showed that the incoming liquid continued to rise like a jet through the water in the model.

The effect of placing three normal horn gates in a row with the sprue located on one end is shown in Figs. 13A through 13D. With this design metal entered initially through the horn next to the sprue, Fig. 13B, but later most of it entered through the horn farthest from the sprue, Fig. 13C. After the mold was partially filled, the middle horn began to feed as seen in Fig. 13D.

Reversed horn gates are commonly believed to pass metal with little turbulence. With a single reversed horn a jet of molten steel again was produced but its height was slightly less than that produced by the normal horn gate. When three reversed horn gates were used in a row with the sprue on one end, Fig. 14, the horn farthest from the sprue fed first and continued to deliver most of the metal, as shown by the disturbance on the surface. Turbulence at the center of the partially filled mold indicated that the middle horn did feed to some extent at this stage. When the sprue was placed in the center of four reversed horn gates, as in Fig. 15, the horns farthest from the sprue did all the feeding, as shown by the surface.

Step Gating—The purpose of a step gate is to produce a steady temperature gradient from the bottom of the casting to its riser without the spattering characteristic of top pouring. As the metal level in the casting reaches each succeeding higher step, this step should begin and the lower steps stop feeding.

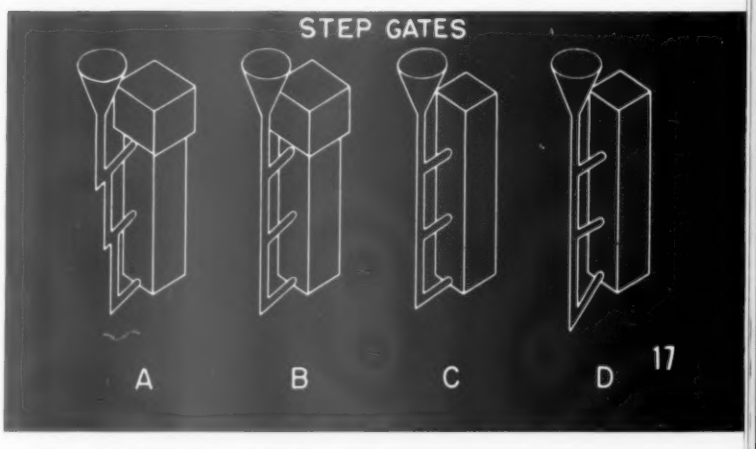
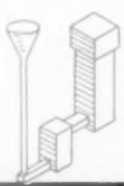
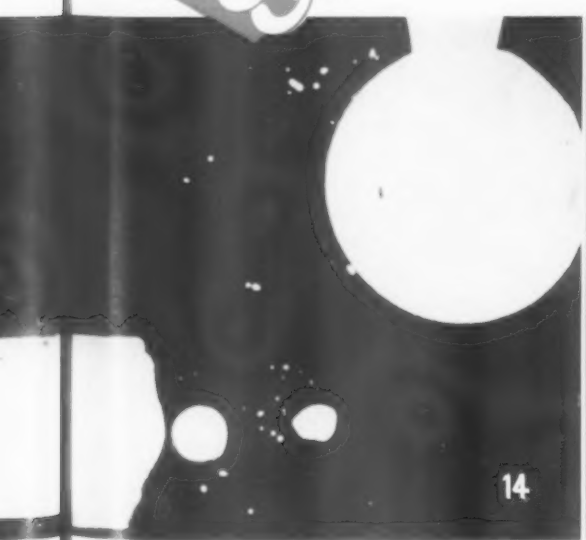


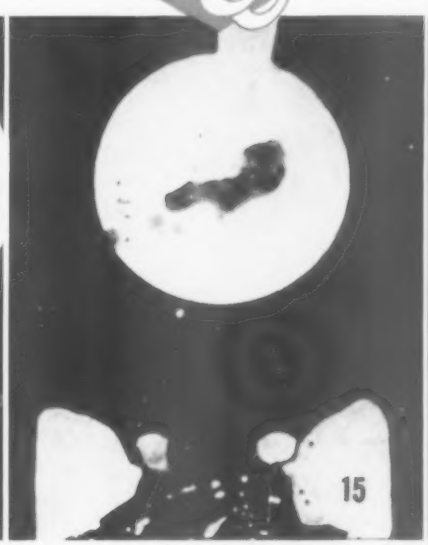
Fig. 17—Step gates. In A and B, step angle is 30 degrees from horizontal, distance between steps 9 in. In C and D, steps are 6 in. apart and horizontal in C. Bottom step of D inclines 60 degrees from horizontal

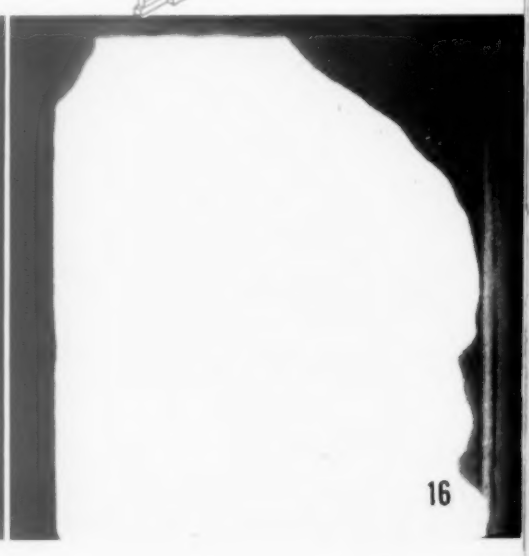
The first step-gate system studied, Fig. 17A, was an offset gate in which the vertical distance between steps was 9 in. and each sprue was offset 1 in. horizontally. The steps were inclined upwards 30 degrees from the horizontal. With this gate, the bottom step fed initially but before the metal reached the middle step, the top step began to feed and the bulk of the metal entered through the top step.

The next system studied, Fig. 17B, was a straight step gate with no change in distance between steps and inclination from the previous example. With this design the metal entered the mold only through the bottom step. As the metal in the mold reached the middle and upper steps, (*Please turn to page* 252)









Aluminum Alloy Castings

By FLOYD A. LEWIS
Technical Consultant
Aluminum Association

Methods of inspecting aluminum alloy castings for possible defects are described here. This is the eleventh of a series of articles based on a survey sponsored by the Foundry Division of the Aluminum Association

ONE of the fruits of the marked improvements in general foundry technique developed by the aluminum casting industry during World War II has been a generally improved quality.[1] A better understanding of the problem of inspection and some new advances in inspection methods also are important wartime developments contributing toward the production of better castings for peacetime uses.

Prominent among the important wartime advances in quality control were the extended use of x-ray inspection for discontinuities within the body of the metal and the development of ultra-violet inspection of the surfaces for discontinuities not readily discovered during visual inspection. Vital aircraft castings and certain other highly stressed castings may continue to receive 100 per cent x-ray inspection as they did during the war, but the majority of castings for peacetime use will need only limited x-ray examination or none at all. Both x-ray and ultraviolet inspection, however, have become extremely valuable design and foundry-control tools. Thorough inspection of the initial castings of a new design by these methods will indicate when changes in the design, in the pattern or mold equipment, or in the arrangement of gates and risers are necessary or desirable for the consistent production of sound castings.

The importance of carefully controlled foundry procedures in maintaining uniformly good quality in the finished product has been emphasized in earlier articles of this series. By revealing the extent and nature of any discontinuities and their frequency of occurrence, the inspection program provides a check on the various foundry operations. This article therefore appropriately includes a summary of defects that may result from faulty foundry practices and corresponding corrective measures.

Many castings that do not initially pass inspection may be brought up to standard by applying appropriate salvage methods, thereby reducing the number of castings that must be scrapped. Good judgment should be exercised in salvaging operations, however, to assure that in any given instance the salvage cost will not exceed the value of the casting.

Although the majority of foundries leave to the customer the matter of making any necessary mechanical, structural, or special tests to determine the fitness of castings for special purposes, many foundries perform tensile and chemical tests on a

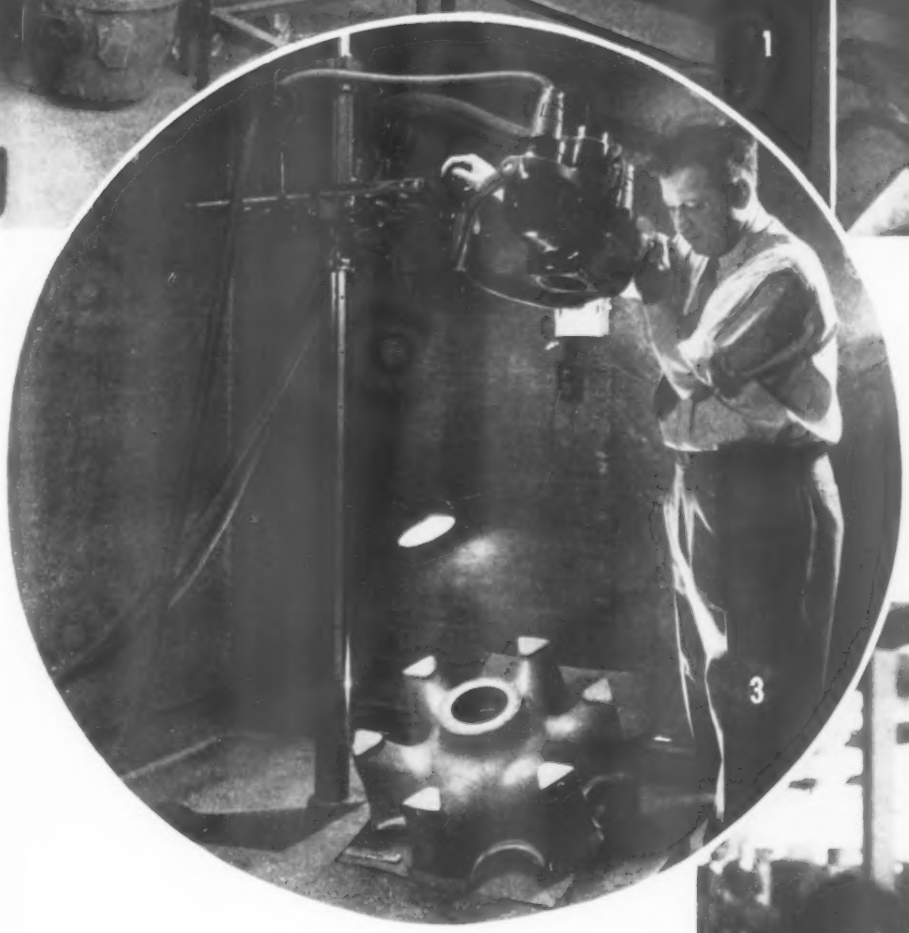


Fig. 1—A section of the inspection department in an aluminum foundry

Fig. 2—Inspectors viewing aluminum alloy castings for visual defects

Fig. 3—Permanent mold aluminum casting set up for x-ray inspection

Fig. 4—Checking brinell hardness of piston castings

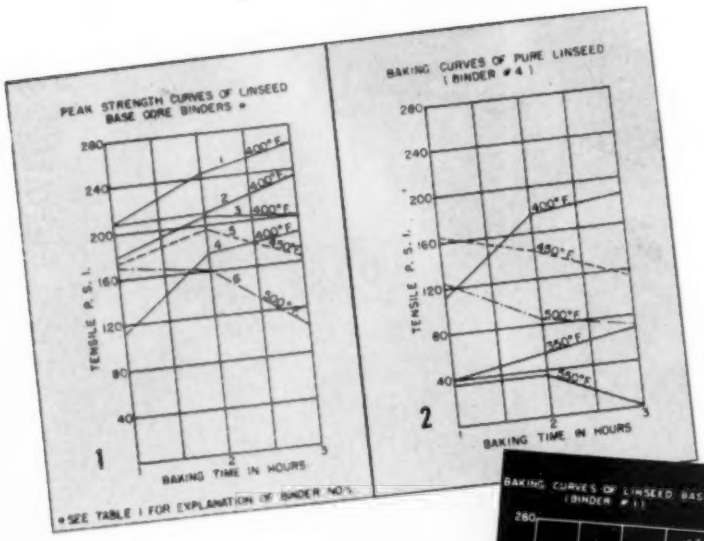
regular routine basis. Test methods specified by the American Society for Testing Materials usually are followed in such cases.

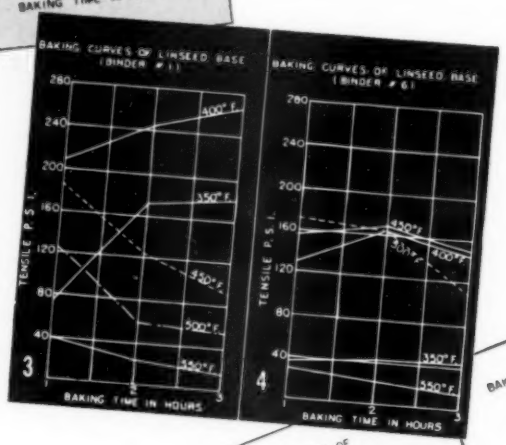
Quality Standards—Before a quality control program can be intelligently set up for a given casting, suitable standards must first be established. These standards will depend on the type of casting and the nature of its application. For a great many applications, the requirements are fairly simple and the castings need only be reasonably free from foundry defects to be acceptable. In other cases, the requirements are more exacting.

The specifications of (*Please turn to page* 230)

Comparative Strengths of CORE

By HIRAM BROWN
Chief Metallurgist
Solar Aircraft Co.
Des Moines, Iowa


PEAK STRENGTH CURVES OF LINSEED BASE CORE BINDERS *
TENSILE P. S. I.
BAKING TIME IN HOURS
1
BAKING CURVES OF PURE LINSEED (BINDER # 4)
TENSILE P. S. I.
BAKING TIME IN HOURS
2
* SEE TABLE I FOR EXPLANATION OF BINDER NO'S.


BAKING CURVES OF LINSEED BASE (BINDER # 1)
TENSILE P. S. I.
BAKING TIME IN HOURS
3
BAKING CURVES OF LINSEED BASE (BINDER # 6)
TENSILE P. S. I.
BAKING TIME IN HOURS
4

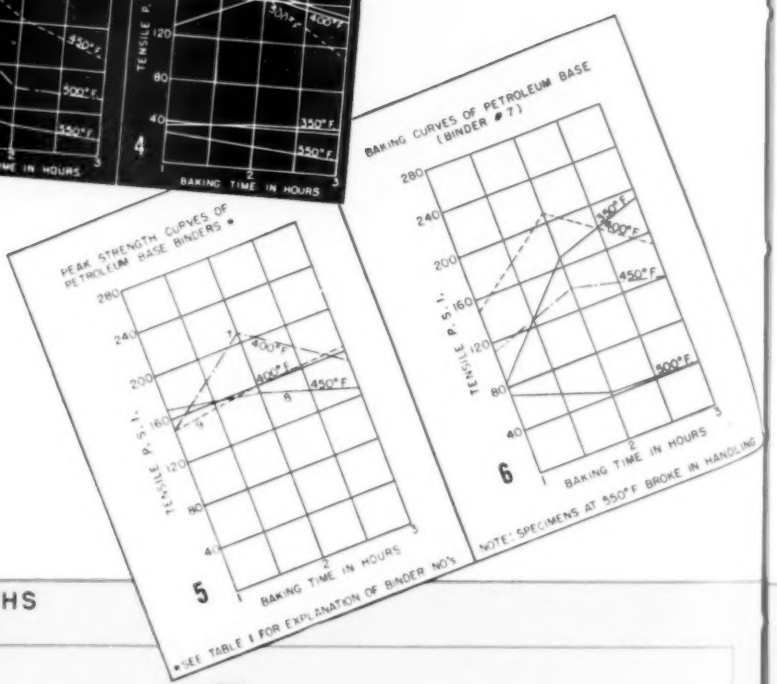
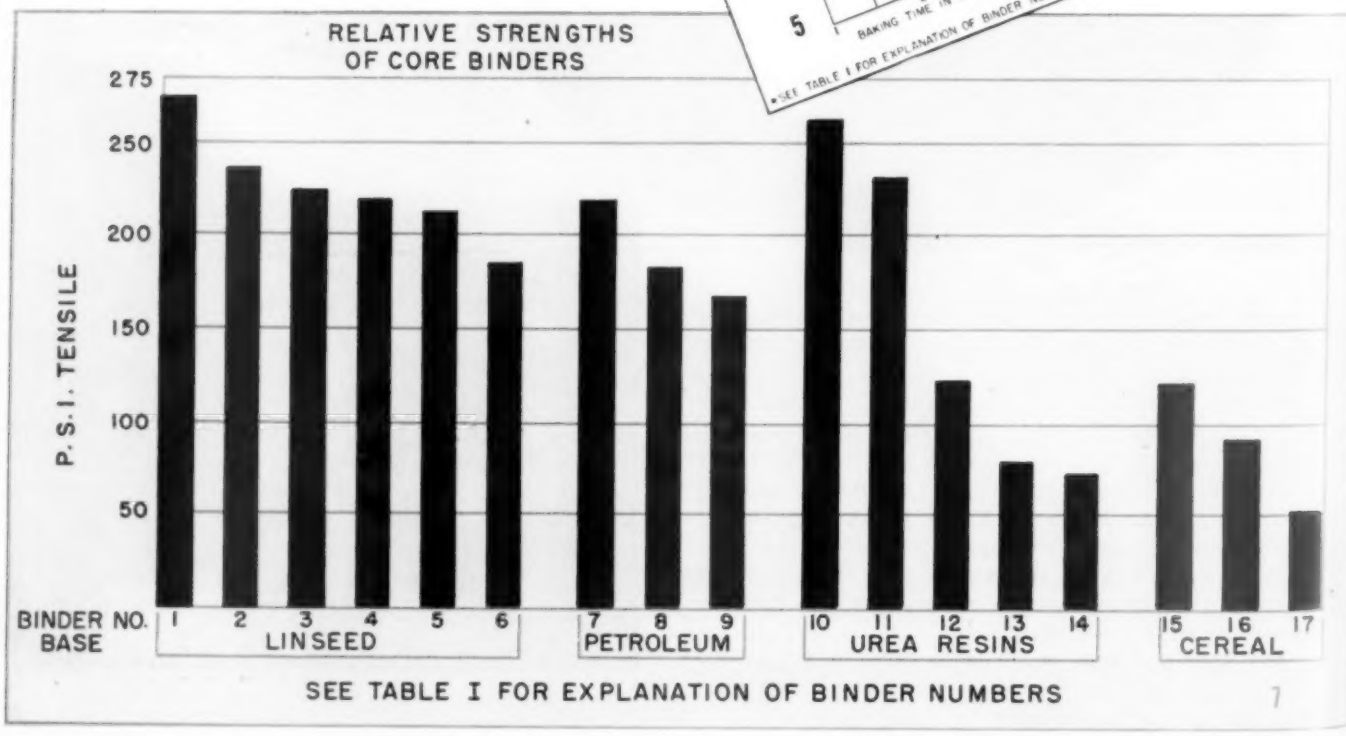

PEAK STRENGTH CURVES OF PETROLEUM BASE BINDERS *
TENSILE P. S. I.
BAKING TIME IN HOURS
5
* SEE TABLE I FOR EXPLANATION OF BINDER NO'S.
BAKING CURVES OF PETROLEUM BASE (BINDER # 7)
TENSILE P. S. I.
BAKING TIME IN HOURS
6
NOTE: SPECIMENS AT 550°F BROKE IN HANDLING

TABLE I—Binders Used in Experiments

Number	Type
1	Linseed base with petroleum polymers, no thinner
2	Linseed base with petroleum polymers and thinner
3	Approximately 70% linseed, 15% rosin, 15% thinner
4	Pure linseed
5	Linseed base, petroleum polymer, rosin, and thinner
6	Linseed base, rosin and thinner
7	Petroleum base, resin, drying oil, and thinner
8	Petroleum base, resin, drying oils
9	Petroleum base, fish oil, drying oils, rosin and thinner
10	Urea formaldehyde
11	Urea formaldehyde
12	Urea formaldehyde
13	Urea formaldehyde
14	Liquid solution of urea formaldehyde
15	Dextrinized corn starch
16	Half dextrinized, half gelatinized corn starch
17	50% dextrinized corn starch, 40% gelatinized corn starch, 10% rosin



gth and Hardness of RE BINDERS

THE foundryman quite often asks himself, "What core binder will I use?" He is confronted by advertising which implies that all core binders are good, and salesmen who may, quite naturally, try to convince him that theirs is the only completely satisfactory one. In trying to evaluate published data on the subject, the foundryman is often confronted by the need for research equipment, or high grade technicians, both of which may be financially out of the question for him.

The purpose of this investigation was, therefore, twofold. One purpose was to find what essential differences existed in the strength and gas content of various types of binders. The other was to use tests which could be duplicated by foundries with a minimum of cost and skill. The strength tests require only sufficient sand testing equipment to measure moisture, tensile strength and core hardness. The gas tests require only simple items such as pipe, tubing, metal pan, etc. While these tests may not be suitable for research work, they are capable of giving reproducible relative results in any given foundry.

A total of 17 binders were used consisting of four general types: Linseed base, petroleum base, urea resin and corn starches. The binders used are listed in Table 1 which gives the approximate nature of each. The binders are identified by number rather than trade name and throughout the test the numbers used refer to the identities in this table. Detailed general discussion of sands and binders has been published by the author elsewhere,[1,2] so at this time only brief summaries will be given regarding the binders used in these tests.

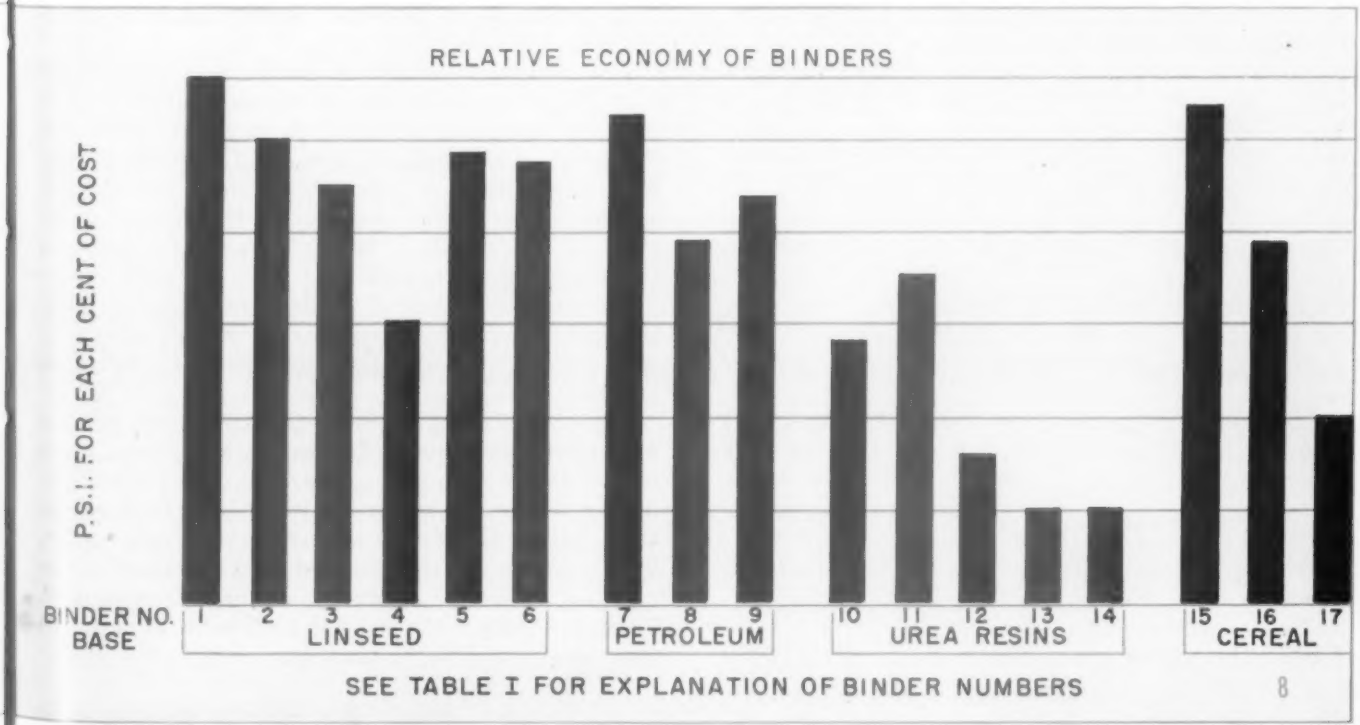
Many types of oils may be used in core oils, but only linseed and petroleum base oils were tested. Practically all commercial core oils are mixtures of base oils with varying proportions of thinner and rosin. Oils are often diluted with thinners such as kerosene. To prevent draining of the oil to the bottom of the core due to this thinner, rosin is often added to increase the viscosity of the oil.

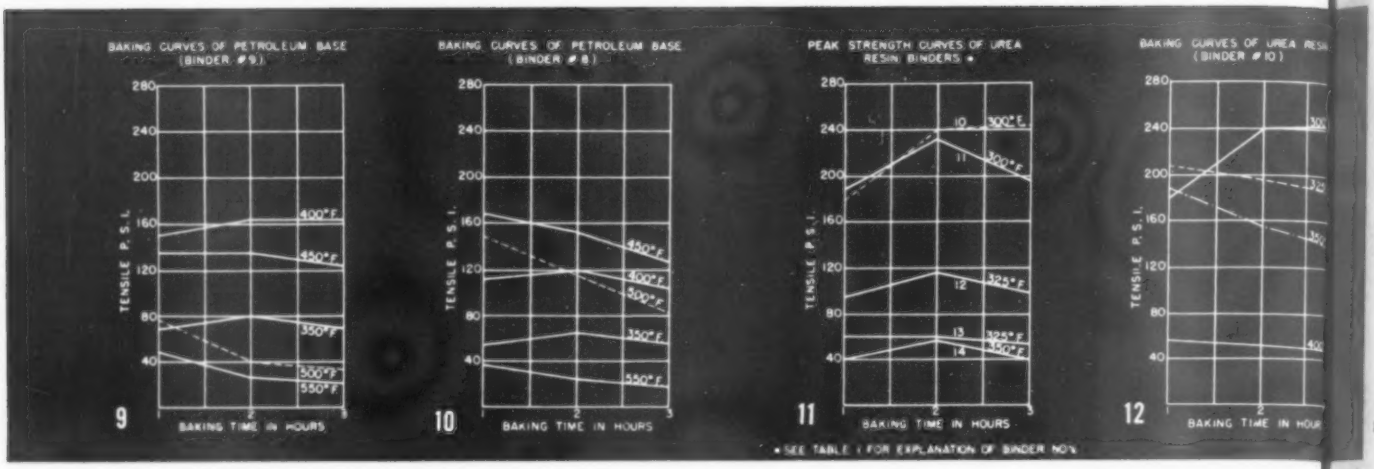
Vegetable oils, such as linseed, are usually light colored and low in viscosity. Due to their fluidity they mix readily with sand without forming balls or lumps. These oils are composed mainly of unsaturated fatty acids with one or more unsaturated bonds to which oxygen attaches in baking. This oxidation process is followed by polymerization, which rearranges molecules to form hard films which hold the sand grains together. Both heat and oxygen are required to achieve strength during baking.

Petroleum oils are polymerized by-products of the petroleum industry. These oils require heat but little or no oxygen to achieve strength during baking. They are usually darker in color than vegetable oils, more viscous, and sometimes tend to form balls or lumps in the sand unless properly mulled.

Dry binders come from a number of sources but only corn by-products (cereal binders) and synthetic resins were tested.

Cereal binders may be broken down into gelatinized starches, dextrinized starches, and intermediates between the two. The difference is a result of the treatment given at the plant producing them. *Gela-*





tinized starches are relatively insoluble in water, add greatly to green strength, but contribute little, if anything, to residual dry strength. *Dextrinized* starches are soluble in water, and add not only green strength, but also contribute to residual dry strength.

Synthetic resins used were urea formaldehydes. Urea is made from ammonia and carbon dioxide, while formaldehyde results from a combination of carbon monoxide and hydrogen. These ingredients are obtained from such basic raw materials as coal, air and water. The essential difference between these synthetic resins and the natural resins is that the latter are thermoplastic while synthetic resins are thermosetting and will set up or cure with oven heat and do not require oxygen in baking to develop bond. Liquid resins "age" on standing, especially in warm weather, and usually are processed to a useful storage life of 90 days. Powdered resins, if kept dry, will have indefinite storage life. The odor of these resins during casting comes from the amines formed and liberated during disintegration of the binders. It can be overcome to a large extent by the addition of urea crystals or sulphur to the sand mix.

Mixing Procedures—For all of the tests an AFS 66-70 mesh high-purity silica sand was used. To this was added the respective binders in ratio of 1-100 by weight. Water was added in proportion by weight equal to 6 per cent in the case of oil binders and 4 per cent in the case of dry binders. The order of mixing for oil binders mixes was sand, water and oil. For dry binders the order of mixing was sand, dry binder and water. No clay or bentonite was added to any mix. Only one type of binder was used in each mix. Batches were of 25-pound lots mechanically mixed.

Strength Testing Procedure—After the mixes were thoroughly mulled (mixed) standard AFS butterfly (figure-eight shaped) tensile cores were rammed. Three such specimens were made from each batch of sand. Along with each set of tensile cores a standard core 2 in. in diameter and 2 in. long was made for hardness tests.

The cores were then baked 1, 2, and 3 hours at temperatures from 300 to 550° F (in 25 or 50 degree intervals) or until such time as the cores showed evidence of severe overbaking. The optimum time and temperature was established as that which gave the highest peak load of the series. Due to the influence of humidity, humidity readings were taken three times daily during the test periods. To minimize the influence of humidity the tests were all run during the same seasonal period of the year. If humidity was too far out of line with previous tests, no cores were run until humidity reached normal. Results of tests run between 30 and 50 per cent relative humidity agreed closely, so that was the range adopted. Baking was done in a thermostatically controlled oven.

After the cores were baked for the required time they were cooled to room temperature in a desiccator and then tested. The average strength was taken from the results of the three tensile specimens broken in each case.

The cylindrical cores were cut in half and hardness checks made at the surface and at the center of the core, using Dietert diamond point scratch hardness tester.

The strength results were plotted against time for each baking temperature and curves drawn to show peak strength, rate at which peak was obtained and the ability of the binder to withstand overbaking. The peak strength for any particular binder was defined as the highest point reached on the baking curve chart of that binder. Baking curves are shown in the accompanying illustrations.

The peaks for each of the binders were then plotted on bar graph to show the relative strengths which were obtained with each type of binder. This is shown in Fig. 7.

The cost of each binder was ascertained and the maximum tensile strength (pounds per square inch) obtained from each binder was divided by the cost per unit of binder. A bar graph was drawn to show the the relative psi for each cent of cost for each binder. This is shown in Fig. 8 and indicates the relative economy of each type insofar as strength is concerned. Thus, the higher the psi for each cent of cost, the more economical is the binder.

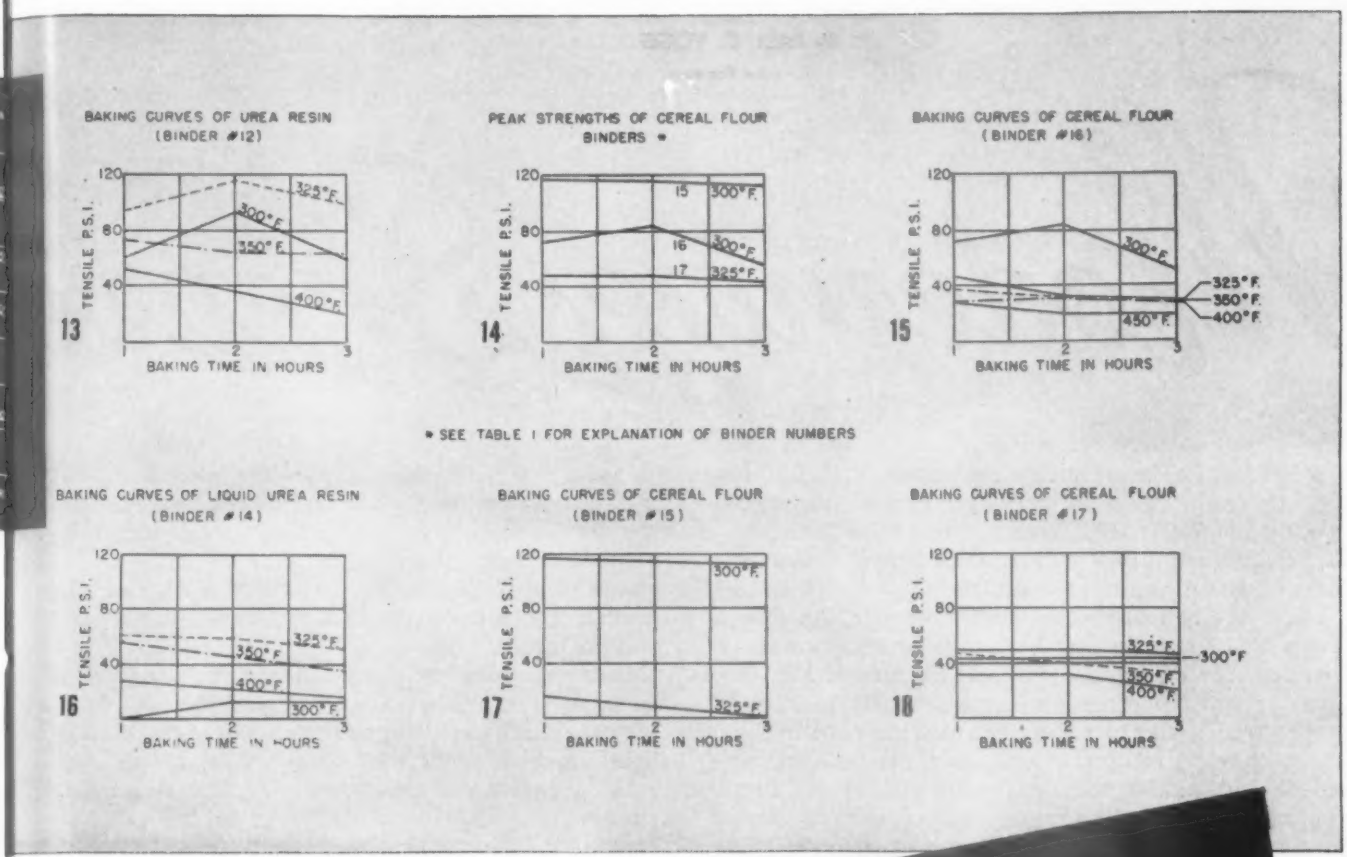
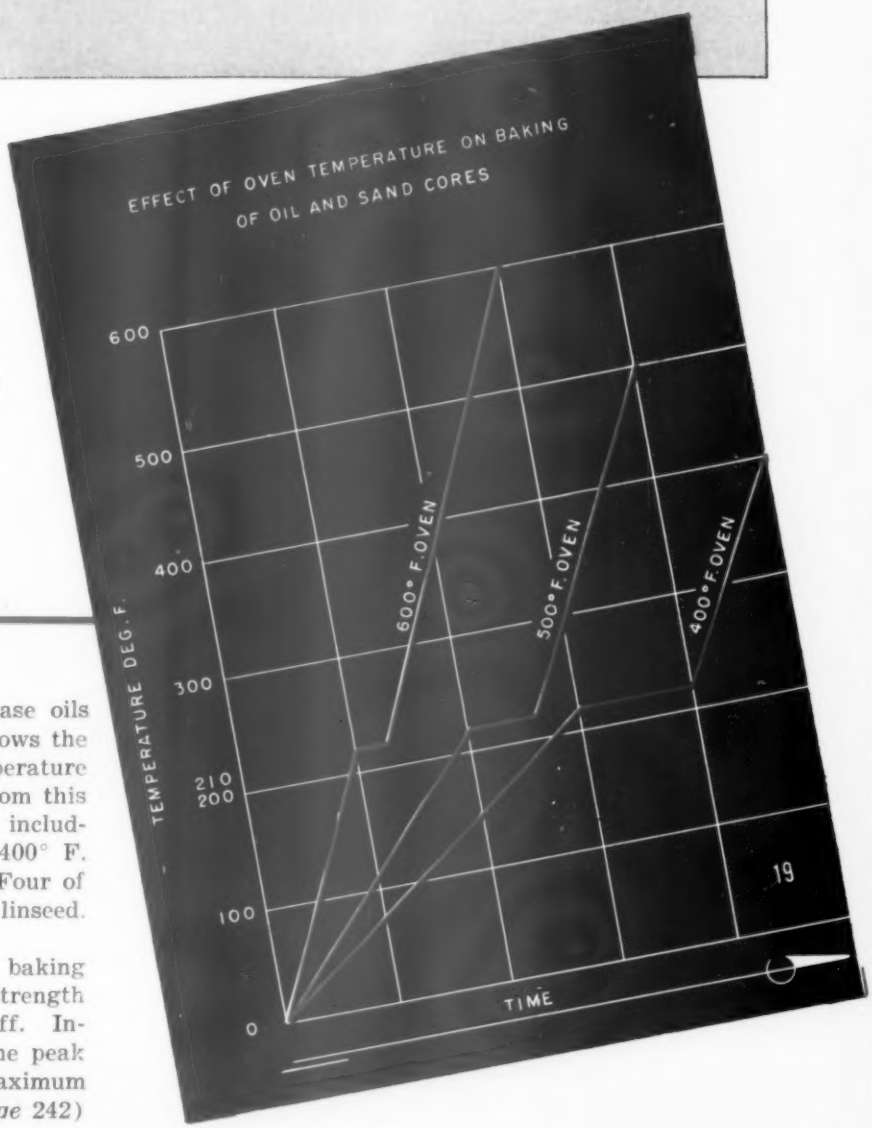


TABLE II—Differences in Peak Strength Within Classifications

Type Binder	Max. Peak psi	Min. Peak psi	Diff. psi
Resins	240	48	192
Linseed	244	160	84
Cereals	116	44	72
Petroleum	208	158	50

TABLE III—Range of Hardness Obtained By The Various Binders

Binder Base	Min. Outside Hardness	Max. Outside Hardness	Avg. Outside Hardness
Linseed	81	97	89
Petroleum	77	84	81
Resin	52	100	81
Cereal	59	79	68



Linseed Base Oils—Six types of linseed base oils were tested including pure linseed. Fig. 1 shows the peak strength of each oil and the baking temperature which resulted in peak load for each oil. From this chart it can be seen that four of the binders, including pure linseed, obtained peak strength at 400° F. One peaked at 450° F, and one at 500° F. Four of the oils reached a higher peak than did pure linseed. Only one fell below pure linseed.

All of the oils which peaked with 400° F. baking temperature were either still increasing in strength after three hours baking or were leveling off. Increasing the baking temperature decreased the peak strength of those oils so the answer to maximum strength in those cases is (*Please turn to page* 242)

By PAUL C. VOGEL
Foundry Engineer
Allis-Chalmers Mfg. Co.
Milwaukee

Modernizes Sheave

NEW mechanized foundry equipment, including a three-unit wet dust collecting system, installed in the West Allis Works of the Allis-Chalmers Mfg. Co. is facilitating production of Texrope sheaves under improved working conditions.

Under the new setup, the sheave floor in the company's No. 1 foundry has been divided into two sections, one for the handling of sheaves up to 30 in. in diameter and the other for those from 30 to 72 in. in diameter. This arrangement, together with the new mechanical equipment employed, provides better control and makes more effective use of molding floor space than under the old method whereby sand for sheave molds of all sizes was mixed in the center of the foundry floor by a crane and clam bucket and moistened manually with a hose.

That section of the floor on which the larger sheaves are processed is equipped with a portable motive-type sand slinger. The other portion has a stationary slinger with a 16-ft turntable for eight stations. Here also is a spillage conveyor, two 6 x 8-ft shakeouts—one for cores and the other for molds, a muller with cooling equipment, a conveyor for delivering conditioned sand to the 20-ton slinger sand hoppers, and conveyors and elevators to carry sand to a 250-ton storage bin, which is housed in a new 28 x 76-ft by 61-ft high addition. This addition has an all-concrete foundation and is constructed of steel with white fireproof Transite panels.

Core sand is conveyed to a hopper outside the building where it can be either returned to the unit or to the dump.

Molds processed on the small sheave section floor are rammed by slinger, conveyed on rollers to a roll-over-draw machine, finished, closed, poured, and cooled on roller conveyors. They are then passed onto the shakeouts, behind which are dust and smoke collector hoods which handle 18,000 cubic feet of air per minute. Sand shaken loose from the cooled molds is passed over a magnetic pulley to remove scrap iron and is then screened before going to the muller.

When cooled, the small solid castings are tumbled while the larger ones are shot blasted. For this latter operation, a continuous overhead conveyor type shotblast system, which is able to handle sheave wheels as large as 72 in. in diameter, 24 in. face, and weighing approximately two tons, has been installed.

In addition to the wet dust collectors, a new mercury arc lighting system makes it easy for workers to see the bottom of the deepest mold.

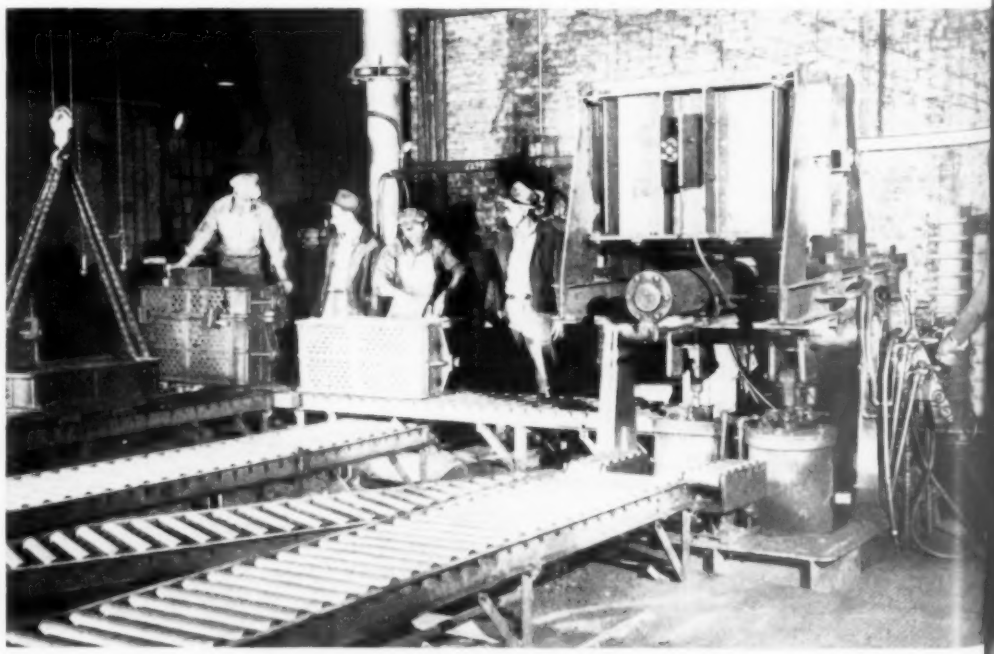
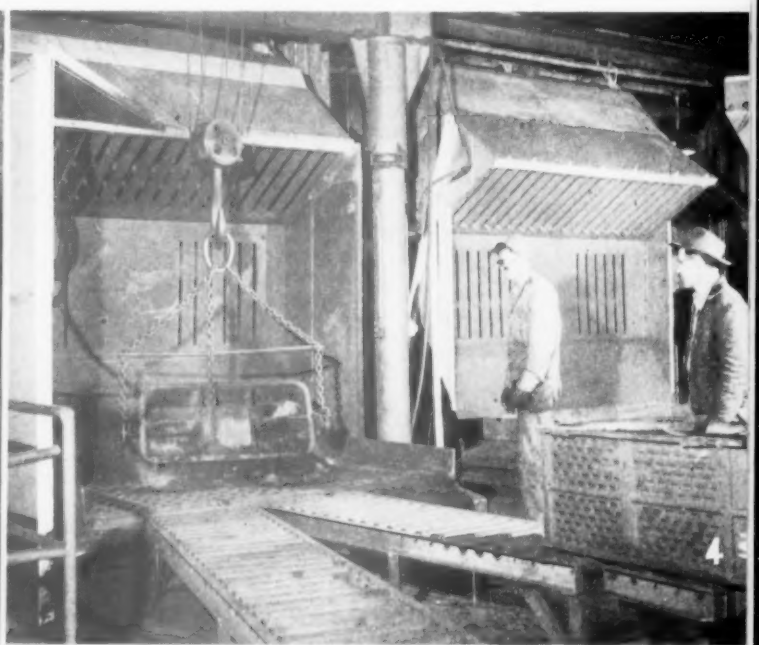


Fig. 1—Drag half of the mold is conveyed from turntable (Fig. 2) to rollover machine and the pattern drawn. After cores are set and mold closed runner box is formed on top of cope. Completed mold then is pushed out on pouring area conveyor

Fig. 2—Stationary sandslinger serves 16-ft turntable incorporating eight stations to make sheave molds up to 30-in. diam. Watching operations at left are (l-r): Gustave Hintz, superintendent of Allis-Chalmers' No. 1 foundry, and John Leisk, general superintendent of pattern shop and foundries

Fig. 3—Pouring and casting cooling floor. Conveyor line in foreground returns empty flasks from shakeout to turntable. Next line carries poured molds from pouring area to shakeout. Continuous shotblast system is in left background

Fig. 4—Two 6 x 8-ft shakeouts are effectively hooded



PERMANENT MOLD Gray Iron

BY THE MILLION

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

BY THE judicious combination of modern foundry metallurgy, specialized materials handling techniques and good plant housekeeping, fitted to the time-tested performance of the Holley-type permanent mold machine, the Foundry Division of Eaton Mfg. Co. at Vassar, Mich., has realized a new level in high-volume production of high quality gray iron castings in almost limitless variety on continuous production operation and ranging in weight from a few ounces up to approximately 15 lb each. Concurrently has come a respectable profit performance, permitting continuation of plant rehabilitation to the point where the present 125,000 sq ft of brick and steel buildings are scarcely recognizable when compared with the old Eaton-Erb Foundry of 15 years ago (THE FOUNDRY, April, June, 1933).

Last year the plant turned out 52 million castings, with finished weight of 49 million pounds, or an average of 0.94-lb each. This year, the record probably will be exceeded in the face of continuing strong demand from diversified industries such as automotive, refrigeration, farm equipment, road building machinery, machine tools, railroad equipment and the like. It is possible to turn out 500,000 individual castings of smaller than average size over a 16-hour day, from 18 permanent mold machines. However, production of 225,000 per day would be more nearly average for a diversified schedule. As an aid to diversification and sales value stability, the foundry attempts to sell to many industries covering a wide range of products and does not confine too great a tonnage to any single customer.

Metallurgical control is essential in the modern foundry and this function receives special attention at Eaton, all the way from constant checking on raw materials charged into the cupola down to the spout metal and slag. It has proved essential to obtain an iron analysis of 3.50-3.65 total carbon, 3.40-3.55 graphitic carbon, 2.50-2.65 silicon, 0.70-0.90 manganese, 0.09-0.13 sulphur and 0.20-0.25 per cent phosphorous, particularly in view of the erratic qualities of pig iron, coke and scrap available today.

In this connection, Eaton metallurgists take slag samples every half hour from the cupola and observe the color of fractures, which is of course a measure of cupola melting conditions. A bottle green color is considered normal; if it becomes lighter, the addition of silica rock to the charge is ordered; if darker, a fluorspar or fused soda ash addition is indicated.

Inclusion of 5 to 15 lb of silica per limestone charge in the form of Ohio silica pebbles ranging beween $\frac{3}{8}$ and $\frac{3}{4}$-in. in size is held to be of major importance in reducing hot erosion of the cupola lining. This practice has been especially helpful in avoiding melting zone burnout in the cupolas and has resulted in a considerable savings of refractories.

A typical charge shows: 1300 lbs of pig iron in three types—12.5 per cent basic, 3-5 per cent silvery,

Castings

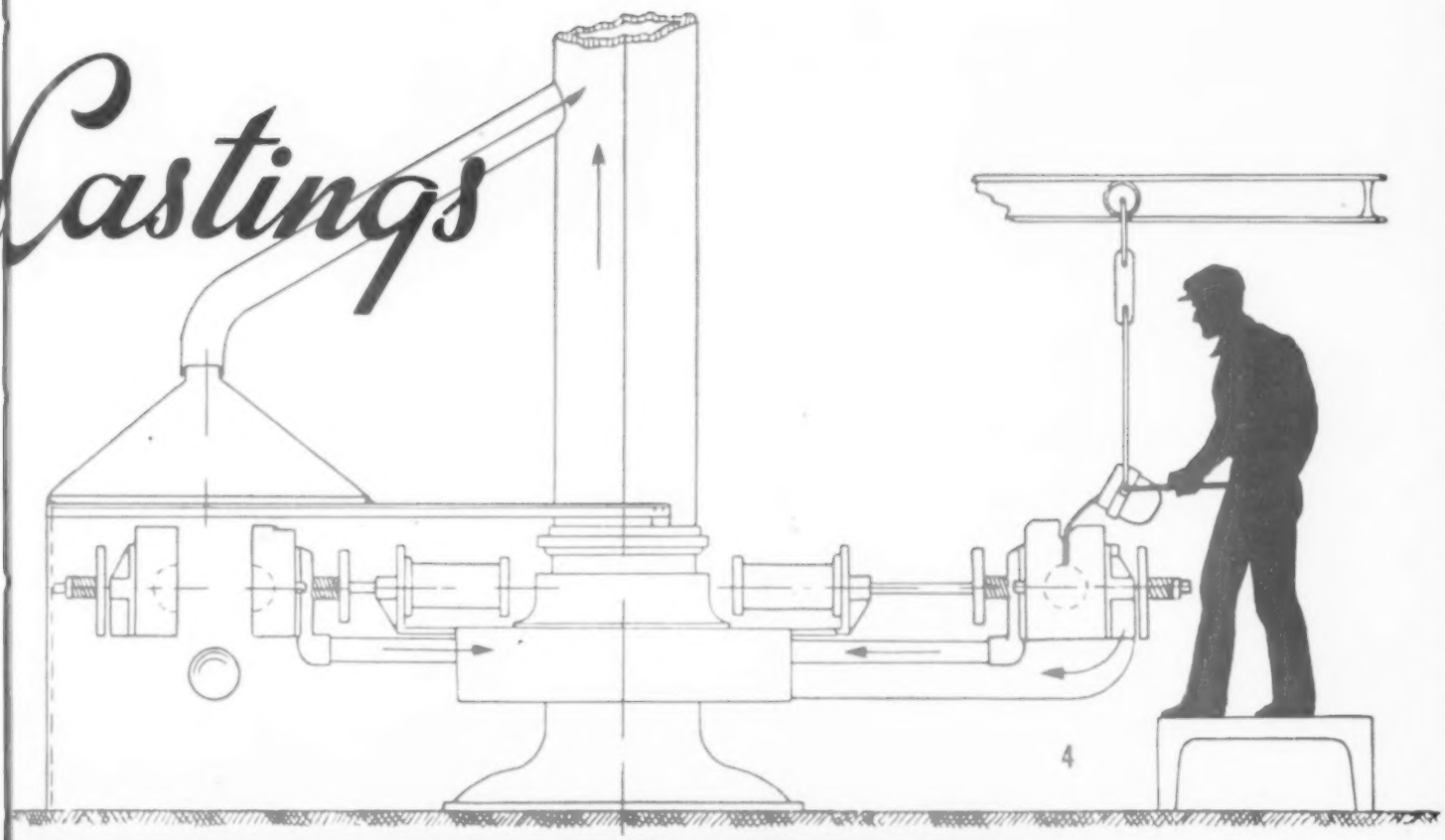


Fig. 1—Spacious storage yard served by A-frame craneway adjoins cupolas and accommodates large tonnage of pig iron, scrap and coke

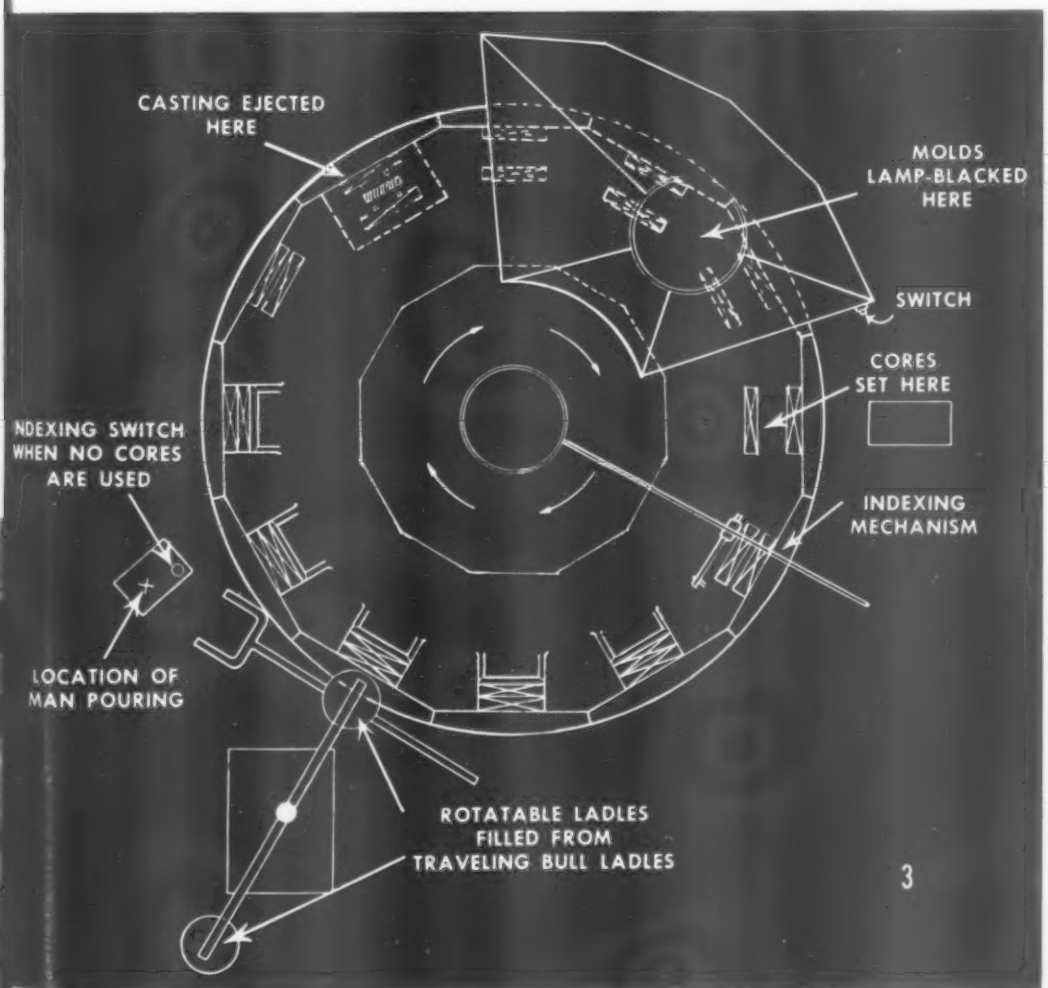


Fig. 2—About 40 taps an hour are made from cupola to 1000-lb bull ladle traveling on overhead monorail

Fig. 3—Operating stations on Eaton 12-head permanent mold machine

Fig. 4 — Cross-sectional view of permanent mold machine

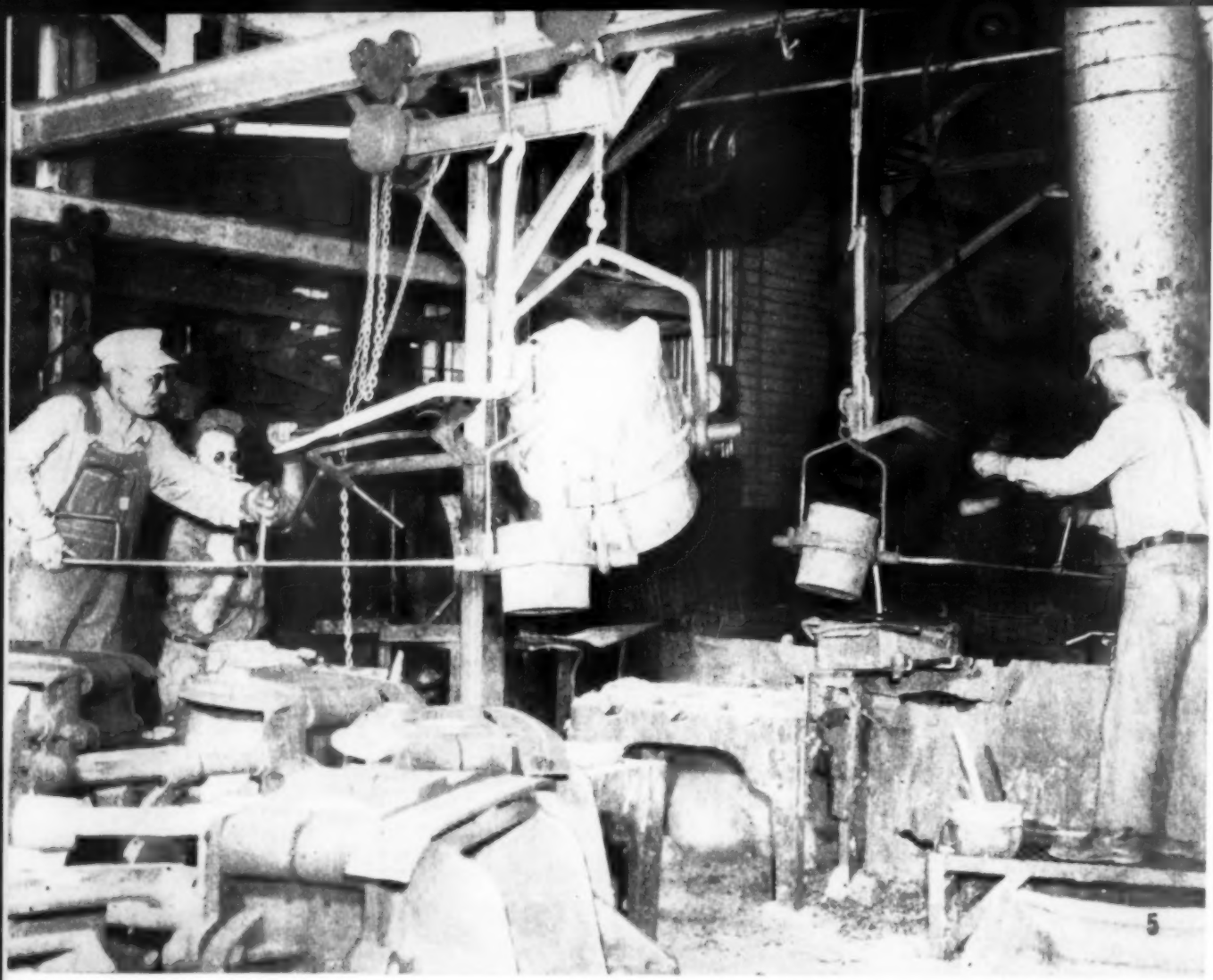


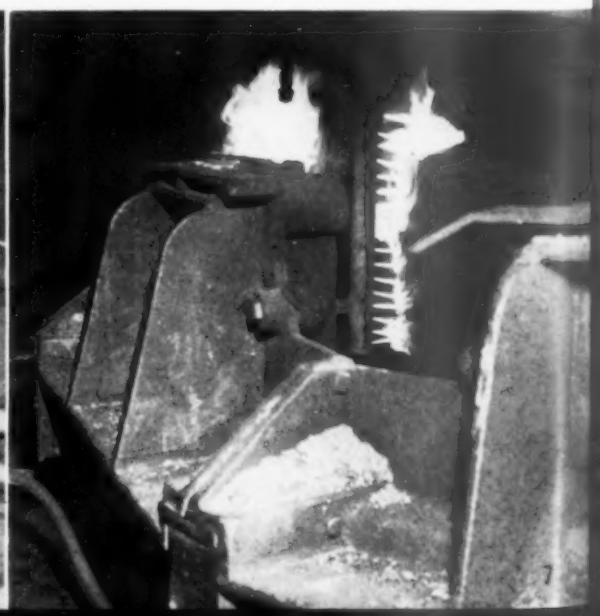
Fig. 5—Bull ladle is moved over monorail system to permanent mold machines where metal is transferred to 125-lb pouring ladles

Fig. 6—Closeup view of pouring a mold as it moves around on machine table. Mold in foreground has not yet closed and locked

Fig. 7—Just before reaching pouring station, each mold passes by multiple acetylene flames where its two surfaces are smoked

Fig. 8—Cores are loaded on trays and placed in vertical baking oven in background

Fig. 9—Discharge end of horizontal tumbling mill from which castings, gates, sprues, etc., fall onto sorting conveyor where castings are removed from scrap



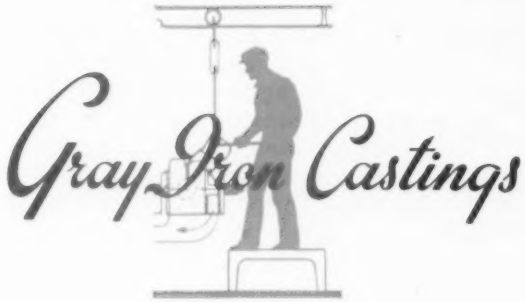
the balance foundry and/or malleable; 1300 return scrap, 400 cast scrap, 420 coke, 86 limestone, 10 silica and 2 fluorspar. Typical slag analysis is: 49.0 SiO_2, 30.2 CaO, 18.35 Al_2O_3, 2.25 MnO and 1.0 per cent Fe_2O_3.

Chemicals on iron at the spout are run every 90 minutes, for a check on carbon, manganese and silicon. Phosphorus and sulphur are checked frequently throughout the heat.

From a lengthy study conducted at the University of Michigan several years ago on the properties of permanent mold gray iron, it was concluded these irons have a microstructure of ferrite and fine graphite, called eutectiform graphite. Faint traces of pearlite sometimes are present. The irons are sensitive to section size, although not to the degree of sand cast iron. The smaller the section size, the finer is the graphite pattern, and in large sections the center may contain some fine flake graphite. Brinell hardness for all sections sizes was found to be in the range of 170 to 207. An accompanying table summarizes physical properties in test bars of four diameters.

As a means of obtaining a rapid, visual check on production iron, plant metallurgists are experimenting with a special type of permanent mold gray iron chill block, poured big end up and giving in a single casting three cylindrical sections—¼ x 1½-in. at the bottom, ½ x 1-in. at the center and ¾ x 1-in. at the top. The two smaller sections are broken at about their center point and the character of the fracture observed. The bottom section usually will be entirely white iron, the center with 3/64 to 1/32-in. of chill. Variations from this appearance are interpreted as a signal that a deviation has occurred in the melting process. Continuous study is being made to improve and evaluate the results of the chill block test as outlined above.

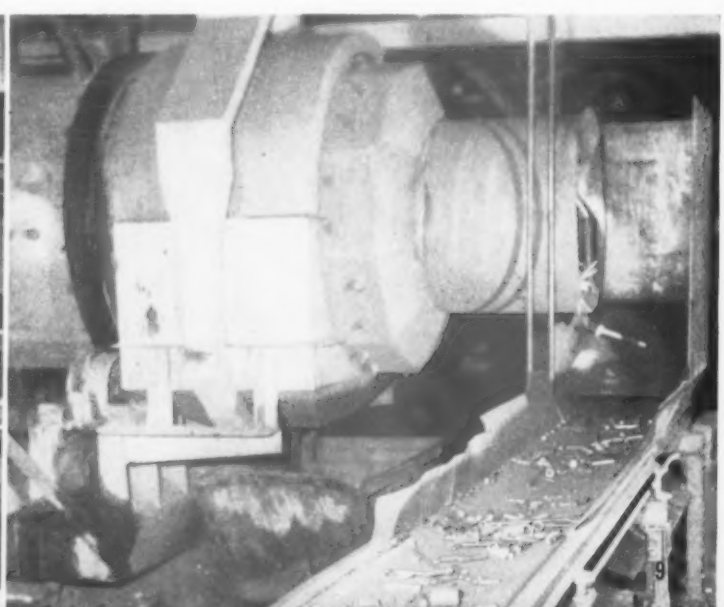
Three coupolas each lined to 54-in. diameter, have a melting capacity of 13-14 tons per hour, only one being operated at a time while the other two undergo relining. Relining of a coupola normally requires 24 man-hours, a crew of three men handling chipping, rebricking, preparing the bed and burning in before the start of melting. Air blast averages around 5800 cfm, although this varies with the size of the coke and density of return scrap. When smaller coke is charged, the blast is stepped up to as high as 7000 cfm. Two new positive displacement type blowers have been installed with a third available for emergency.



Tapping temperature is close to 2800°F and normal production pace calls for about 40 taps an hour into 1000-lb bull ladles, from which the iron is transferred to 125-lb ladles at the permanent mold machines. All ladles travel on a system of overhead monorails. Both types of ladles are lined with refractory cement and sand, and are dried for 16 hours in gas-fired ovens.

Pouring temperature of iron at the machines is in the range of 2500-2600°F. This is regularly checked at intervals by optical pyrometer. A typical temperature sequence from cupola to machine is as follows: At spout 2820°F; from bull ladle 2690°F; first pour 2650°F; last pour 2520°F.

An important phase of permanent-mold gray iron casting production is the annealing operation, also involving a high degree of metallurgical control. All castings, regardless of shape or size, are processed through open pusher-type annealing furnces, of which there are six, each 54 ft long, either oil or gas-fired with a capacity of 1.45 tons per hour. Castings are loaded from skips into alloy trays 48 in. long and 9 in. wide. These trays are placed on the furnace hearth rails and are pushed mechanically through the furnace. Total time required to traverse the furnace is 3 hours and 30 minutes, of which 1 hour and 30 minutes is at preheat, 30 minutes at temperature, and 1 hour and 30 minutes cooling. Furnace temperature, closely controlled by recording pyrometers, is in the range 1620-1640°F. Maximum temperature reached



by the castings is 1580°F. At the end of the cooling period, casting temperature has lowered to 750-800°F. Many types of castings may not require heat treatment, but as insurance against any overchilling, all types are given the furnace anneal, avoiding any problem of segregation and maintaining hardness in the 170-207 brinell range.

Studies have indicated that each casting is moved approximately 17 times while in process; thus each ton of castings shipped results in a 17-ton materials handling problem. It is multiplied still further in the light of the fact that individual castings are so small. Flexibility and fluidity of handling methods are essential. A widely accepted belief throughout industry is that the way to move large volumes of production is by conveyor, whether gravity roller, power roller, slat, belt or overhead chain. The difficulty with power conveyors in some cases is that, should the conveyor break down, the entire operation is suspended. At one time, the Eaton foundry employed a slat conveyor to move castings from the permanent mold machines to the cleaning, sorting, and annealing operations. It has been discarded in favor of a basic layout built around the fork lift truck and tote box or skip for the movement of all castings after they leave the permanent mold machines. An exception is the melt conveyor used to receive all castings, gates and sprues as they fall from a horizontal cylindrical tumbling mill, but this is to facilitate sorting the various types of castings from one another and the segregation of scrap.

Each skip has a pair of trunnions set slightly back of center, which rest on either of two sets of semicircular notches cut into the forks of the trucks.

Physical Properties of Four Sizes of Permanent Mold Gray Iron Test Bars

Properties	Section Size 0.5"	0.875"	1.2"	2.0"
Tensile strength, psi	52,267	34,142	32,050	22,533
Tensile modulus psi × 10^6	19.53	17.57	13.60	11.98
Brinell hardness	197	187	179	170
Compressive strength, psi	124,342	112,017	119,583	99,783
Torsion, yield shear, psi	....	23,160	19,208	20,208
Torsion, rupture shear, psi	....	43,750	42,186	36,483
Torsion modulus, psi × 10^6	....	7.435	6.747	6.310
Transverse breaking load, lb	606	1665	2670	8200
Transverse deflection, in.	0.178	0.166	0.283	0.240
Modulus of rupture, psi	98,950	75,933	70,783	62,700
Bending modulus, psi × 10^6	19.60	16.94	14.38	14.87
% Plastic work	57.1	40.1	37.7	30.5
Endurance limit, psi	32,000	20,000	19,500	13,500
Endurance limit notched bars, psi	15,000	15,000	....	13,000
Heat-treated tensile strength, psi	82,433	50,250	38,783	32,242
Heat-treated tensile modulus × 10^6	19.20	17.40	13.36	10.95
Growth, increase in volume, % per per cycle	0.133	0.170	0.180	0.330

Notches nearest the truck carry the box in a horizontal position, while those nearest the end of the forks are used for disposal of the load as the skip tips forward when lifted, due to the off-center position of the trunnions. There are approximately 1000 skip boxes available for use throughout the plant and they are moved by a fleet of 14 fork lift trucks.

An important advantage of the skip method of handling is that it permits a variable float of castings between the various operations subsequent to casting —tumbling, heat treating, shot blast, grinding, inspection and shipping. If normal flow at any one operation is interrupted, skip loads of castings can be "stored" pending resumption of normal flow between operations.

Another advantage of the lift trucks and skips is in transfer of parts to shot blast and grinding operations, where they can be dumped into overhead hoppers stationed alongside these units, from which they descend by gravity to the machine operators who deposit them, after processing, into other skips positioned beside their machines, thereby eliminating virtually all manual handling.

Extensive use of trucks in this way calls for clear aisleways and special precautions for safety. Trucks are all equipped with signal horns and truck aisleways are marked off by painted lines.

Turning now to the casting operations, hot metal from the cupola is transported by 1000-lb bull ladles to the 125-lb pouring ladles at the machine pouring stations on an overhead monorail system which is provided with a series of switches directly in front of the cupolas to permit running the ladle under the tapping spout of any one of the three melting units. The pouring ladles are suspended from the building superstructure on ball and socket joints to allow for necessary swing as the (*Please turn to page* 173)

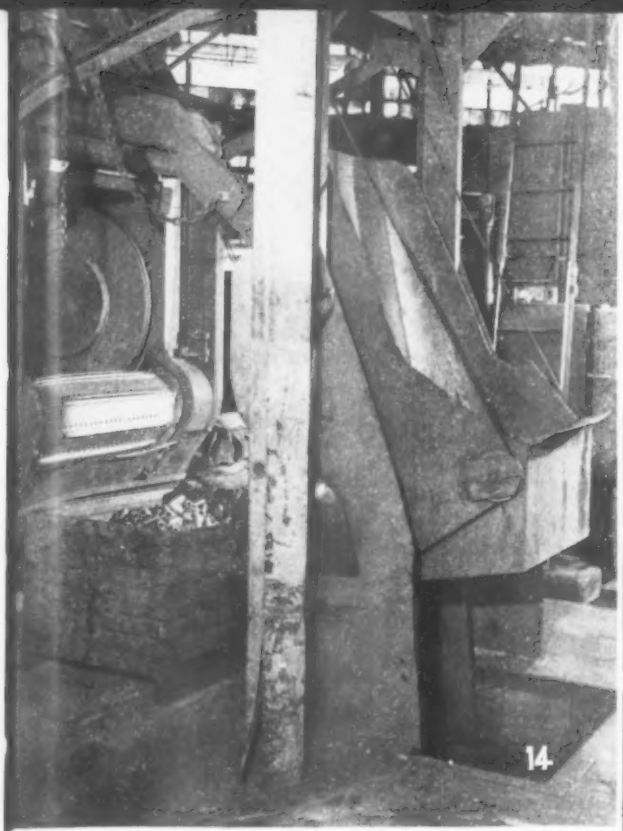


Fig. 14—One of new group of abrasive blast cleaning machines with mechanical loading and unloading

Fig. 15—Drilling boss in one half of mold. This is a new type with impression cast in the surface and requiring only a light grind to finish

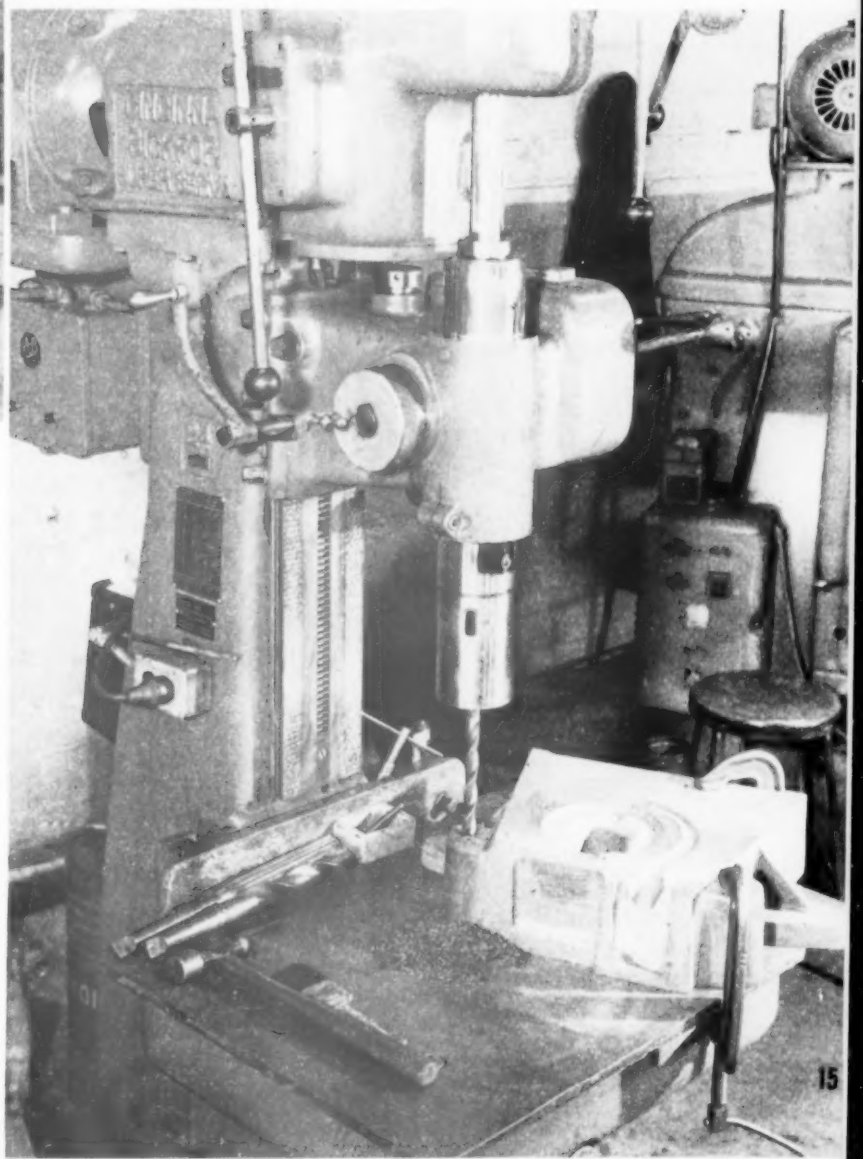
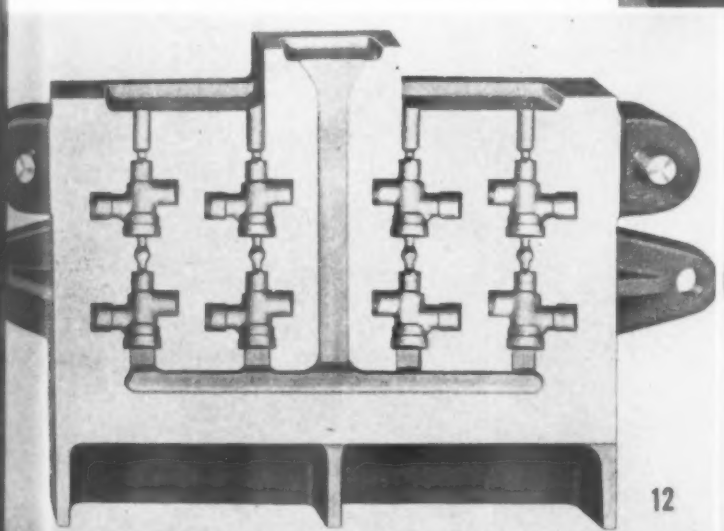
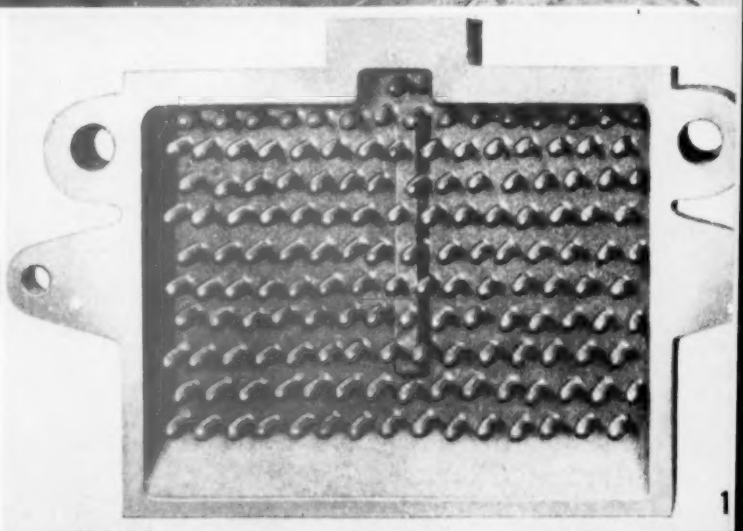


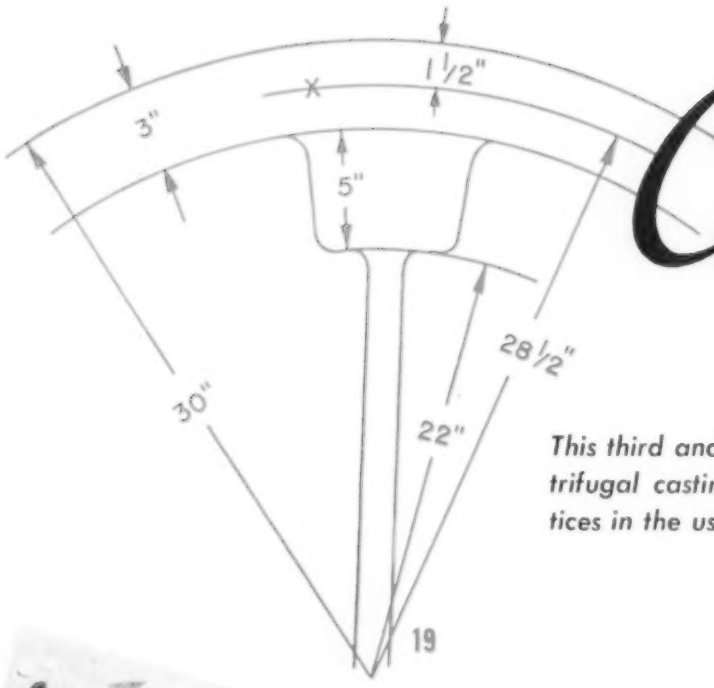
Fig. 10—Castings are handled through cleaning operations by means of fork lift trucks and skips

Fig. 11—Castings emerging from discharge end of 54-ft annealing furnace and being loaded into skip for transfer to blast cleaning

Figs. 12, 13—Impression and reverse sides of typical mold, showing method of gating and risering a group of eight castings in one mold; also arrangement of cooling pins on reverse side, over which blast of air is drawn as mold is being poured and cooled



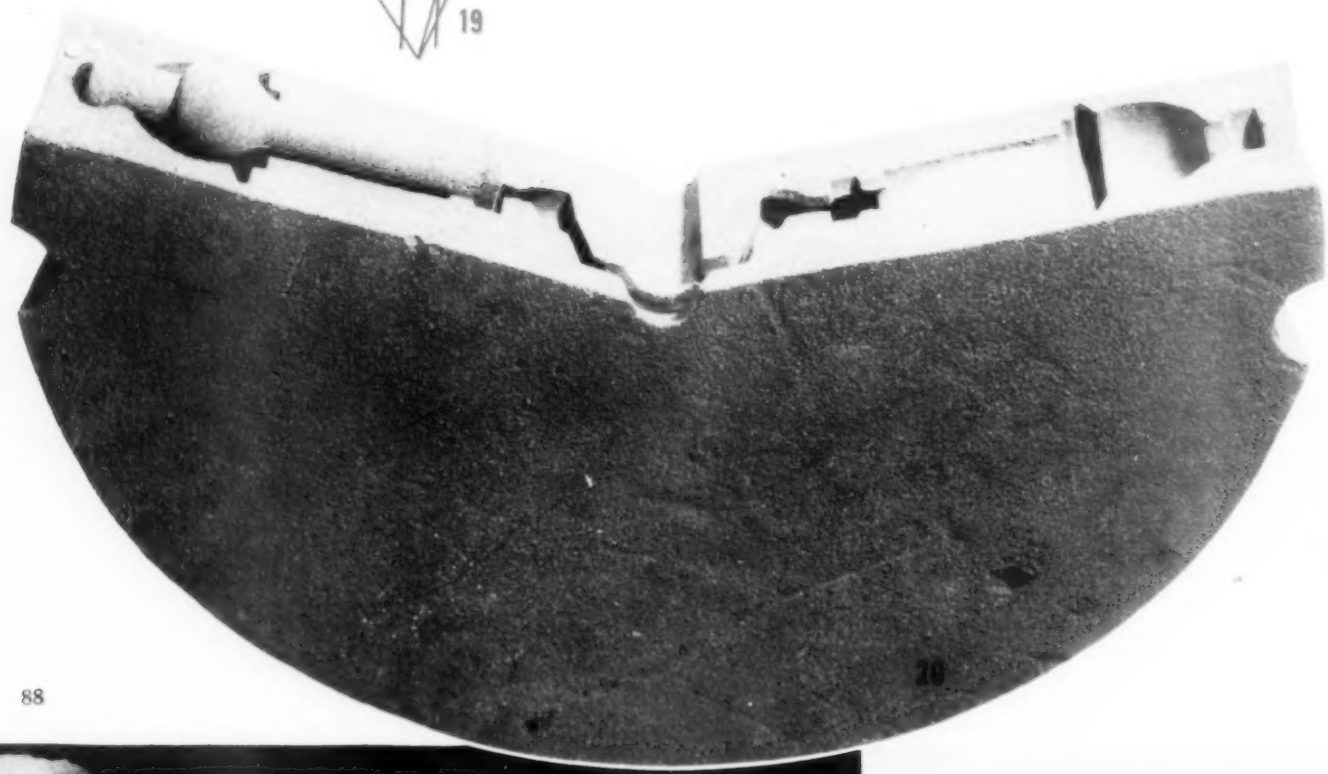




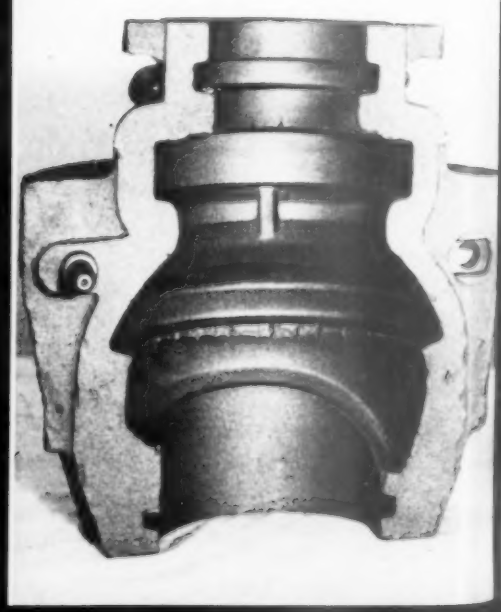
19

Centrifugal

This third and concluding article on the subject of centrifugal casting of steel discusses recommended practices in the use of the semi-centrifugal and centrifuging processes


20

21



Casting of Steel

By JOHN HOWE HALL
Consultant
Swarthmore, Pa.

AS the steel is poured into the revolving mold its direction of motion, of course, abruptly changes from vertical to horizontal, and the rotation of the mold makes it difficult to so regulate the flow of the metal that it will be anything but turbulent. The sand at the point where the stream of steel first strikes is therefore subjected to greater abrasion than in the case of static pouring and, in addition, many parts of the mold are subjected to the rapid and turbulent flow of steel. Consequently, the point of first impact must be made of a very hard sand mixture, and the surfaces of the mold over which the steel runs should be heavily nailed to prevent the sand from being cut away. Wright and Caine[6] even recommend that the mold be poured while stationary, and the spinning be started after it is full, thereby sacrificing at least a part of the advantages usually ascribed to the method.

For the comparatively small gear blanks, wheels, etc., commonly made by this method, either oil sand or a strong dry sand mixture is satisfactory. In pouring spoke type and plate type wheels of larger size and heavier sections, the author found it impossible to use dry sand mixtures that had proved perfectly satisfactory for ordinary static practice, because of excessive scabbing and burning down of the cope sand. Even sands used in regular practice for gate cores were found to scab and wash to a considerable extent, and the castings poured in them often had an exceedingly poor surface.

In some cases, cement-bonded sands are being used in the production of castings of this type, the high initial strength of the material making it particularly suitable to resist the abrasion that occurs in pouring. As in molds of cement-bonded sands poured statically, the area where the stream of steel first strikes and adjacent portions of the mold should be faced with a special refractory material which has less tendency to burn-on to the steel than silica sand has. Chamotte is also quite satisfactory in shops familiar with its use, and it is particularly well suited for making the part of the mold that is exposed to the stream of steel when pouring is started.

Whether the castings be made singly in regular cope and drag flasks or in stacked cores, the joints between cope and drag or between cores are exactly the same as in regular foundry practice. Every foundryman is familiar with run-outs at the joints of molds, and when centrifugal force is added to gravity, the chances of having the metal force its way out of the mold are naturally greater then in static practice. Therefore, it is not to be expected that very high rotating speeds and the resulting great centrifugal forces could be used for this sort of work. In addition, the flasks themselves and the sand rammed up in them are seldom, if ever, well balanced, so that they would vibrate badly and might even fly off the table of the machine were they revolved at the really high rates used in true centrifugal pouring.

For this reason, instead of figuring the speeds of rotation to produce centrifugal forces of some multiple of gravity, the advocates of semi-centrifugal casting recommend that the machines be spun at such a rate as to give a definite surface speed, usually from 450 to 600 fpm at the periphery of the casting. To quickly estimate the speed of rotation required to secure any desired surface speed with castings of different diameters, Donoho gives the nomogram shown as Fig. 24, which covers the range of sizes and speeds commonly used in the process.

These comparatively low rates of rotation do not produce really high centrifugal force, so that the solidifying metal is not under pressures comparable to those set up in the true centrifugal method. The rejection of nonmetallics from the outer parts of the casting toward the center is therefore much less

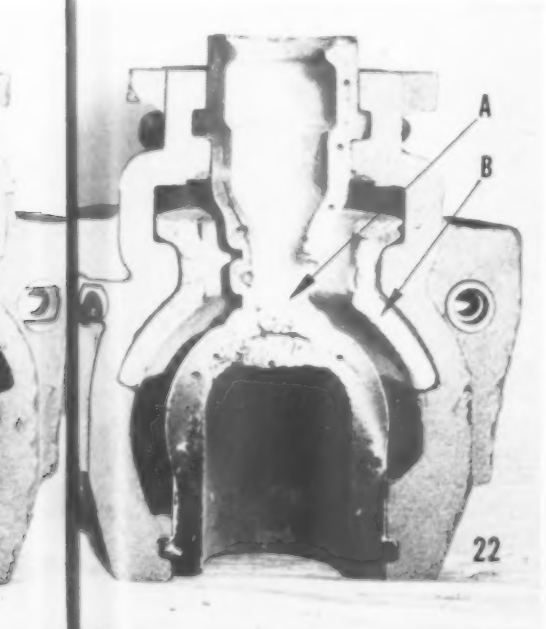


Fig. 19—Sprocket with enlargement at end of sprue for feeding rim

Fig. 20—Sectional view of bearing casting cope and drag with a center core set at left

Fig. 21—Steering end ball socket—yield 74 per cent

Fig. 22—Halves of permanent mold. Half splash core and half center core are shown set in on the right. A—gate entrance. B—splash core

Fig. 23—Sectional view of bearing casting core emphasizing the "umbrella" gate

Fig. 24—Nomogram for calculating spinning speeds to constant peripheral velocity according to Donoho

pronounced than in true centrifugal pouring. The formation of blow-holes due to the liberation of gas from the steel in solidifying also is not restrained to the same extent as in the true centrifugal process, though probably the tendency to form blow-holes is not as great as in a static mold.

That these tendencies are less marked in semi-centrifugal than in true centrifugal pouring is due not only to the lower rotational speeds used, but also and perhaps chiefly, to the fact that in the former process the casting is completely surrounded by sand. Therefore, it must radiate its heat into the mold from all its surfaces, so that directional solidification from the outside toward the center can occur only to a slight extent, whereas in true centrifugal pouring solidification is almost wholly from the outside.

The centrifugal force for any given diameter of casting, in terms of the speed of rotation in surface feet per minute, may be calculated as follows:

If S = surface speed in feet per minute; N = revolutions per minute; D = diameter of casting, in inches; R = radius of casting in inches, then $\pi DN = 12\,S$ and $N = \frac{12\,S}{\pi D}$, or $\frac{3.8197\,S}{D}$, or $\frac{3.8197\,S}{2\,R}$

Substituting in this equation the value of N in terms of Q and D, already given, $N = 265.3\sqrt{\frac{Q}{D}}$, or

$\frac{3.8197\,S}{D} = 265.3\sqrt{\frac{Q}{D}}$, whence, $Q = \frac{.00020729S^2}{D}$

From inspection of this equation, it is plain that if all molds are spun at a definite surface speed, the centrifugal force, Q, in terms of gravity, will decrease as the diameter of the casting is increased.

Pressures set up in the metal, in terms of diameter or radius and surface speed in feet per minute are calculated from Carrington's[5] equation,

$$\text{Pressure} = \frac{(R^2 - R_1^2)\,N^2\,(.255)}{70383},$$ where R = outside radius in inches; R_1 = inside radius in inches; N = rpm.

Substituting for N in this equation, its value given previously, $N = \frac{3.8197\,S}{2R}$, we have,

$$\text{Pressure} = \frac{(R^2 - R_1^2)\,(3.8197\,S)^2\,(.255)}{4R^2} \text{ whence,}$$

$$\text{Pressure} = \frac{70383}{70383}$$

$$\text{Pressure} = \frac{.0000132\,S^2\,(1 - R^2)}{R^2}$$

In the case of a completely filled mold R_1 is zero, so that the expression is, Pressure = $.0000132\,S^2$.

In other words, the pressure at any given place in the casting varies directly with the square of the velocity in feet per minute at that point. If 600 fpm peripheral speed be chosen as the rate at which to spin the molds, regardless of their diameter, the pressure is $.0000132\,(600^2)$, or 4.75 psi at the periphery, decreasing progressively to zero at the center. These pressures do not seem very high but they are about all that a sand-to-sand joint between cope and drag or between cores, can be expected to resist without allowing the steel to run out of the mold. Moreover, to increase them markedly involves the use of speeds of revolution that would make the molds vibrate violently and even tend to fly off the plate of the machine.

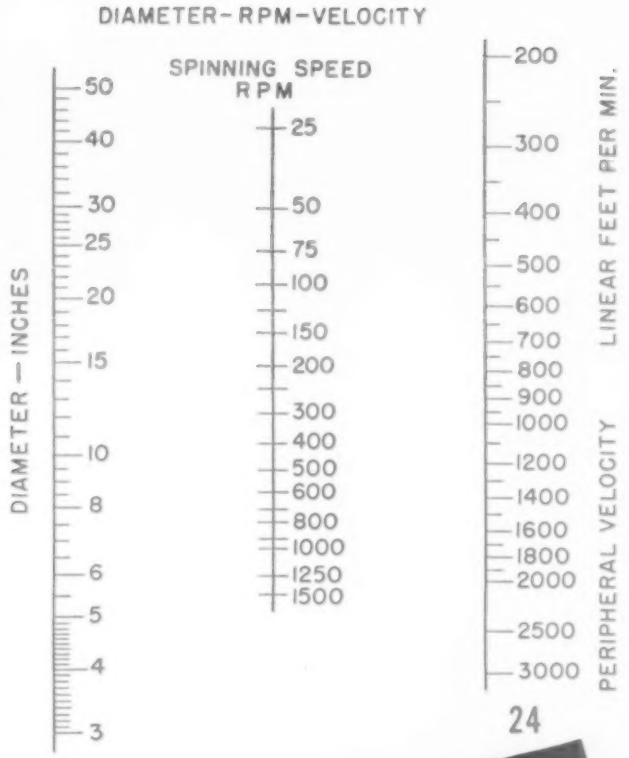
As already mentioned, when an annular casting is being made, the place of (*Please turn to page* 183)

Fig. 25—Centrifugally cast clusters of brake shoes—yield 65 per cent

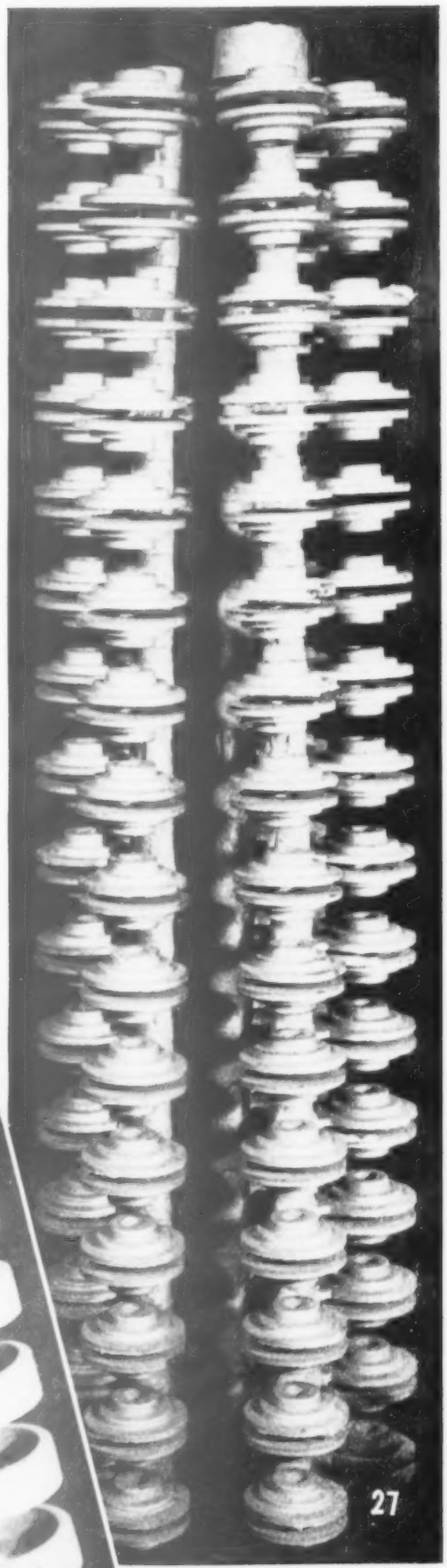
Fig. 26—Cluster of engine covers with three castings in layer attached to central sprue

Fig. 27—Centrifugally cast cluster of bogie washers

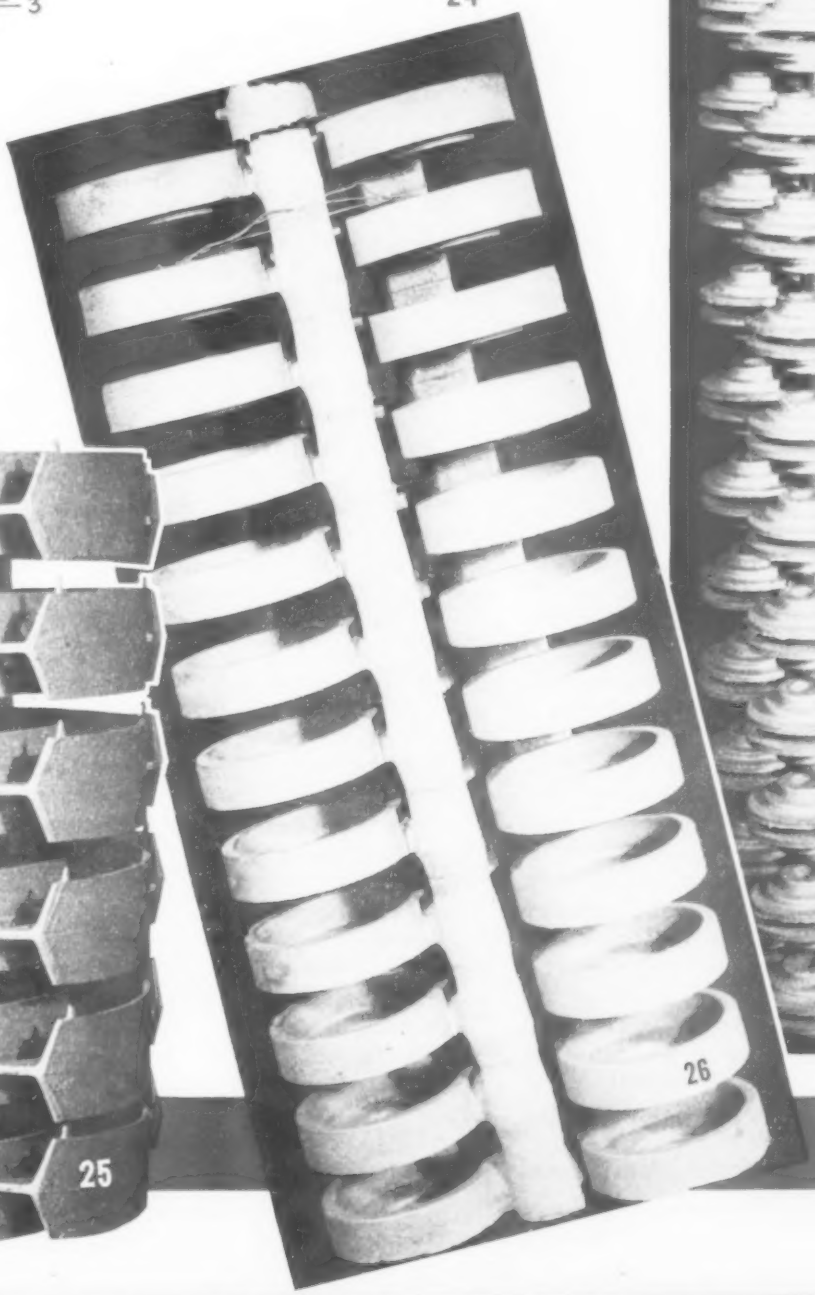
23


DIAMETER-RPM-VELOCITY
SPINNING SPEED RPM
DIAMETER — INCHES
50
40
30
25
20
15
10
8
6
5
4
3
25
50
75
100
150
200
300
400
500
600
800
1000
1250
1500
200
300
400
500
600
700
800
900
1000
1200
1400
1600
1800
2000
2500
3000
PERIPHERAL VELOCITY LINEAR FEET PER MIN.

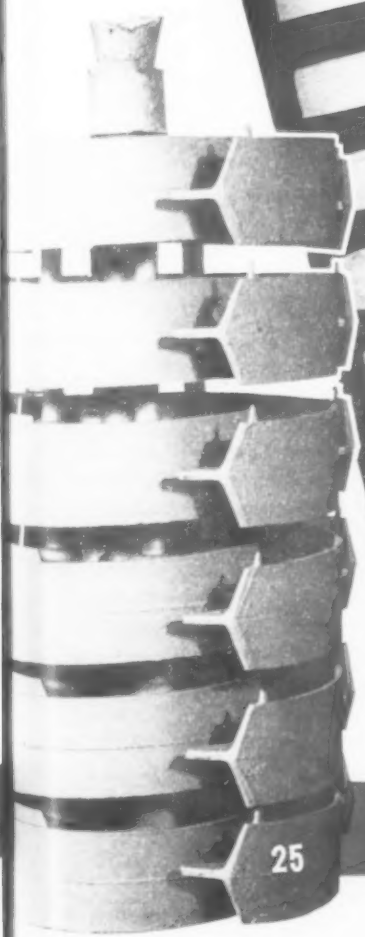
24



27



26



25

INCENTIVES *in the* NATIONAL ECONOMY

By J. W. NICKERSON
Bigelow, Kent, Willard & Co.
Boston

IT IS fast becoming a self-evident truth, not only in the United States, but in labor-governed Britain and in Russia, that high productivity is the keystone of a high living standard. In this country, we have demonstrated that in a free competitive economy the living standards have risen as productivity and then wages have increased, and as costs and prices have decreased.

The Bureau of Labor Statistics tells us that the total gain in productivity in manufacturing industries for the 20 years between world wars was 125 per cent. During the same period, average hourly earnings rose 28 per cent, unit labor costs dropped 44 per cent, wholesale prices of manufactured goods dropped 38 per cent.

On the other hand, since World War II, hourly earnings have far outdistanced productivity. This is a serious condition which clearly threatens our standard of living, particularly if sales volume and employment shrink.

Today, labor, management and government agree, as a generality, upon the importance of high productivity. Unfortunately, productivity cannot be gained on a general basis until it is accomplished in specific instances. But in thousands, yes millions, of specific instances we find opposing opinions. It is here that there seems to be a battlefield of conflicting interests. Obviously, in view of the general agreement on the importance of productivity these individual conflicts should be eliminated.

Their elimination is the most important act in our industrial life today. How can this be accomplished? There are many excellent public relations programs bringing out the fact that high productivity has resulted and should result in lower labor costs, lower prices, greater sales volume, greater employment, higher wages and higher standards of living. But these programs, desirable as they are, will not of themselves secure agreement on the individual jobs as to the necessity of high productivity. Neither will the arbitrary and unilateral applications of any kind of incentives.

For maximum results the man on the job must feel sure himself that the conditions surrounding the job and the policies of management are completely fair and to the direct interest of himself and his co-workers. There must be mutual confidence, respect and understanding.

Labor is, and always has been, torn between fears as to the security of its jobs, and hopes as to the proper distribution of the fruits of its efforts. Management must not only perform the mechanical engineering job of perfecting its equipment, layout, planning, methods and material control, but it must also solve the problems of human engineering. It must understand clearly the fears, the hopes, the aspirations of labor and its representatives. It must be willing to work out in agreement with mutual understanding the relationship which is to exist between what labor gives and what it receives.

Three Major Contributions by Labor

What labor gives may be grouped into three categories, in each of which incentives may be used.

1. Its time or presence on the job.
2. Its daily physical and mental efforts toward high productivity.
3. Its participation in technological improvement. Its contribution in ideas.

In order to avoid the expense of labor turnover and to provide continuity of operations, every company desires to have employees who will wish to remain with it for years and who will be on the job every day. In order that these employees may consider the company a "good place to work," various incentives are used.

In the first place, hourly rates of pay are established, balanced as to skill, responsibility and working conditions, and in good standing relative to competitive and community rates.

Beyond this, foresighted managements are considering such added inducements as pension or profit sharing retirement plans, savings plans, mutual benefit associations, vacations, stabilization of employment, employee publications, and so on. All of these may be considered as incentives toward securing and retaining employees in a plant. They may or may not be more of an incentive than the equivalent in straight wages, depending on local conditions and the point of view of the employees.

Plants which operate on a straight hourly rate basis have no financial incentive to compensate for the varying capabilities or effort of their employees, other than promotions which may be made on the basis of merit. In order (*Please turn to page* 164)

Combined Method for Spectrophotometric Analysis of Gray Iron

By G. T. HENDERSON
Chemist
Worthington Pump & Machinery Corp.
Buffalo

THE extraordinary sensitivity of spectrophotometric methods, especially when employed in conjunction with organic reagents, for the determination of various elemental constituents in an almost endless variety of materials, suggested application to the field of ferrous metal analyses.

Such methods and reagents, although enjoying widespread use in biological, clinicial, and mineralogical work, from the viewpoint of the iron analyst are sporadically and incompletely discussed in the existing literature. The most complete text, Sandel's, *Colorimetric Determination of Traces of Metals*, contains descriptions of methods for the analysis of practically every element, but those pertinent to the iron analyst seem sketchy, unwieldy and inapplicable. Another comprehensive little abstract, Stein's *Organic Reagents in Inorganic Analyses*, does not mention the determination of phosphorus, and frequently recommends the use of alkaline solutions for the determination of other elements, a serious obstacle in iron analyses.

Every routine iron analyst has, at one time or another, deplored the waste of time and material entailed by the usual gravimetric and volumetric methods in use in the control laboratory. It remained for Sobers to pioneer with his so-called "Combined Method." (*American Foundryman*, January 1944, September 1944, August 1945). It is obvious that Sober's early treatment was unsatisfactory, as anyone will discover who attempts to follow him. But he deserves commendation for opening up a new field. His contribution lies in uniting the concept of common sample with the usefulness and sensitivity of the spectrophotometer, for this sensitivity is the heart of the combined method, with its small aliquots.

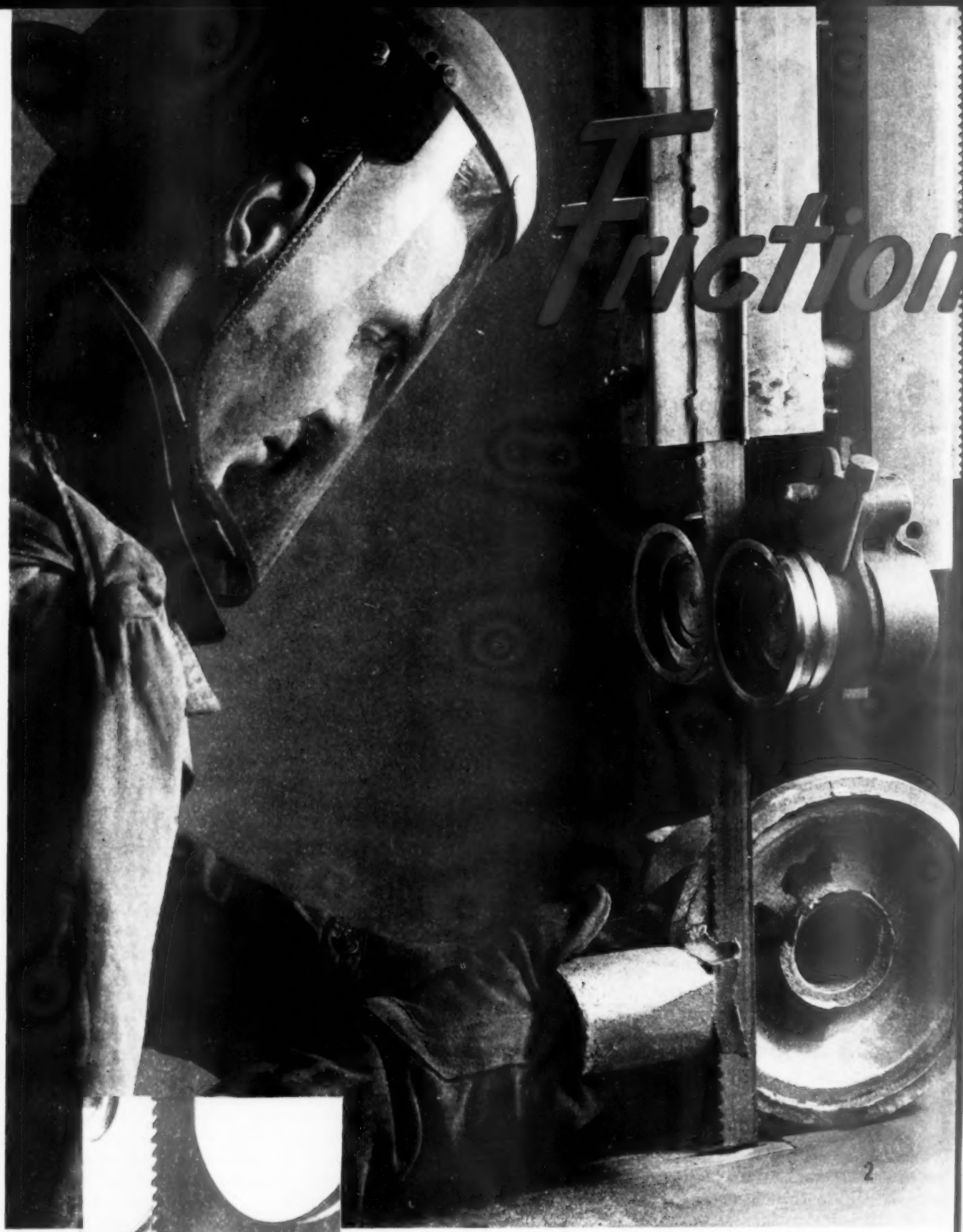
Essentially, the combined method consists of determining the constituents of a given iron, with the exceptions of total carbon and sulphur, from a solution of a single sample. At present, silicon, manganese, phosphorus, chromium, nickel and molybdenum can be determined in this manner. The method, followed to its conclusion, in the determination of copper, vanadium, zirconium, titanium and other alloys, requires further investigation.

Copper can be determined colorimetrically easily enough on an individual large sample, but as yet there is little advantage over the customary gravimetric procedure.

The advantages of the combined method lie partly in the saving of sample weighing time, with concomittant accuracy, for the possibilities of human error are greater at the balance than with the pipette. Volumetric solutions, with the tedious standardizations and continual checking are entirely dispensed with, together with the element of obscure endpoints in titrations. Simplicity, accuracy, speed, and some considerable reagent saving set off the combined colorimetric method from the older wet routines.

In order to determine the wavelength of optimum absorbtion for each element in its proper solution, a Coleman spectrophotometer, Model 11, was chosen as the appropriate instrument. With its narrow wavelength selectivity over the entire practical spectral range, the plotting of absorption curves is greatly facilitated, and freedom from interference can be almost complete.

It is necessary to measure the absorption characteristics of a series of solutions of varying concentrations of a given element, for the wave length of optimum absorption. These values, percentage transmission, are plotted logarithmically as ordinates, the concentrations as abscissa. A straight line should be formed if interference is absent, originating at zero concentration, 100 per cent transmission. An origin at zero concentration and less than 100 per cent transmission indicates the presence of a blank. A slight blank is unimportant, usually being constant in value, but results in some error, and must be compensated when the line is used for an aliquot other than that for which it was set up. Curvature, held unimportant by some authorities, is rather difficult to set up and read. It indicates the pres- (*Please turn to Page* 224)



(Photos courtesy of the DoAll Co.)

Fig. 1—New friction sawing band as it appears preceding the first 20 minutes of cutting. Teeth points must attain the degree of bluntness as shown before the saw reaches its peak of efficiency

Fig. 2—Although the generally accepted material thickness limitation of friction band sawing is 1 in., sections up to 2 in. may be friction cut by rocking the work

Cutting

By H. J. CHAMBERLAND
Springfield, Mass.

Gates and Risers by the Band Saw Method

A FACTOR in promoting efficient foundry practice, the friction band saw materially helps in reducing the cost of gate, riser and other ferrous casting trimming cuts as a whole. One of the prime advantages of the process is low tool cost as distributed over the amount of square or lineal inches the friction band will cut before it has to be discarded. It should be borne in mind that the process has certain material thickness limitations which must be adhered to; however, within this boundary it is a highly economical method of separating metals. Considering long tool life and unexcelled productivity within its scope, friction band sawing equipment is proving an excellent investment in iron and steel foundries.

Insofar as foundry applications are concerned, the friction cutting band has other advantages through which it compensates in greater part for what it must necessarily lose to other methods better adapted to the thicker cuts. Although a 1-in. wide precision saw band is recommended for straight cutting, it also makes friction contour sawing possible to a radius of 9-in. or over; ¾-in. bands are also very often used to navigate with greater ease through hard-to-reach sections of the casting and with general shop applications, ¼-in. bands permit the friction cutting of radii as small as ⅝-in. Because of its close cutting the friction band reduces both the amount of metal lost and subsequent grinding costs. The band is not subjected to any serious effects from its twisting action through work-misguiding errors within reason.

The highest efficiency when friction cutting by the band saw method results from taking advantage of a wide range of velocities made available by the variable speed unit of the machine. Laboratory-tested velocities for materials within the friction cutting category vary from 3000 to 15,000 fpm. Since the softening action of the material directly in front of the saw teeth is in greater part governed by the velocity better fitting the material thickness involved, rather than by Rockwell hardness, the cutting should be done at the proper saw speed as much as uniformity and nature of cut will permit.

Of course with gate and riser work where three or four and even more cuts varying in thickness are involved, it is sound policy to maintain a velocity corresponding to the thicker section and sacrifice what amounts to a negligible drop in overall efficiency. This step is by far less significant as applied to the friction saw than to other cutting methods, because the friction band can remain set at say 10,000 fpm and be kept cutting for six or seven hours on any permissible material thickness with very slight depreciation in saw life. For the fact that when even cutting stainless the life of the friction band is estimated in hours, rather than minutes as is often the case, the importance of selecting the proper course for each application cannot be over-estimated.

It was the writer's pleasure recently to visit a most modern foundry specializing in stainless steel castings, varying in weight from one ounce to one ton. Realizing that stainless in its various forms and analysis is definitely one of the toughest metals to cut or machine, but one that reacts most favorably to the friction band, it is obvious that a cross-sectional group taken from the hundreds of cutting operations diverted to the process in this plant should prove excellent food for thought to the management of other foundries faced with excessive gate and riser cutting costs. The various castings in this particular group, respective areas cut and actual cutting time consumed are listed in Table I. It is well to bear in mind that these particular figures apply to a plant where production is approximately 90 per cent stainless castings, an unusual case of severity on saw life and below average production. With the cutting of gates and risers as a whole, slicing through 1-in. thick sections at the rate of 13 or 14 lineal inches per minute is not casual but day-after-day production.

Whether it friction cuts or actually cuts, the high speed band sawing machine is regarded as one of, if not the most efficient means to cut or shape most industrial materials. From a friction sawing angle, most steel alloys are within the low melting point and therefore lend themselves readily to cutting by friction. Although stainless in all its forms and types responds to the friction band better than to any

other method of cutting, it is yet the most resistant to the process and for this reason cutting rates on most all other steel alloys and cast irons will be found to be proportionately higher.

As previously mentioned, Rockwell hardness is immaterial since hardened steels and particularly welded sections are excellent friction sawing applications. On the other hand, the thickness of cut and the analysis of the material definitely are controlling factors. Various alloys added to the iron alter the softening characteristics of the metal. This, obviously, makes it necessary to change the amount of heat at the point of material-saw contact, with additional heat being required as material thickness increases. Heat requirements must therefore be met by adjusting the saw to the proper velocity as selected from the 3000-15,000 fpm speed range.

High saw speeds and uniform work pressure are what create frictional heat. There is some resistance as the work first contacts the saw but the cutting action starts as soon as the required pressure is applied. The thinner the edge presented to the saw,

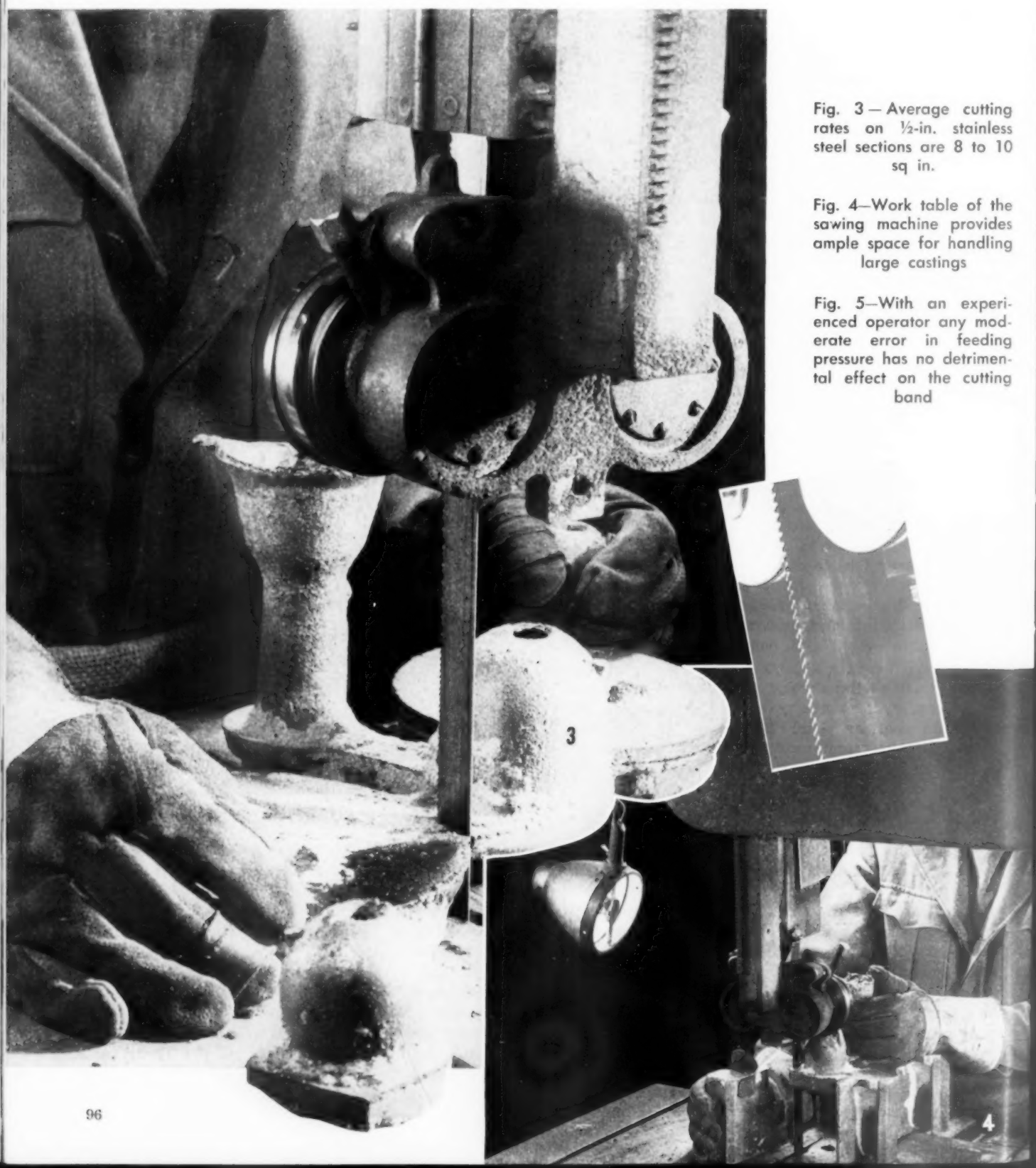


Fig. 3 — Average cutting rates on ½-in. stainless steel sections are 8 to 10 sq in.

Fig. 4—Work table of the sawing machine provides ample space for handling large castings

Fig. 5—With an experienced operator any moderate error in feeding pressure has no detrimental effect on the cutting band

the faster the cutting and the operator usually works out a so-called work "rocking" technique of his own to attain this purpose when cutting the thicker sections. Through these means of work-wheel contact, sections up to 2-in. thick on some castings may be economically friction cut but it is well to abide by the generally applied 1-in. limitation, unless otherwise advised by the manufacturer of the equipment.

Heat as generated to soften the material in the kerf to a plastic state has no effect on the saw teeth or any other part of the friction band. Since the band is 255-in. long, revolving generally at from 2½ to 3 miles per minute, there are actually millions of teeth in action, but they are in sectional contact with the metal but an infinitesimal part of a second. Any amount of heat generated is readily dissipated as the long band revolves around the 36-in. wheels.

Heat penetration into the side walls of the finished cut is almost negligible, it increases in depth with increased material thickness but never exceeds 0.002-in. With untreated materials responding to air hardening, the material immediately adjacent to the cut will be found to have an extremely thin skin hardness due to the temperature reached by friction. So long as the material responds to air quenching, the air entrained in the rapidly moving saw cools the material rapidly enough to cause a minute skin hardness detectable only by the time-honored file test, since the hardening zone is so thin that even testing instruments fail to register measurements.

Behind the zone of hardness will be found a very narrow annealed area, so small that it is not objectionable. Friction sawing, therefore, does an excellent job in cases where heat distortion due to machining presents a problem. In case of heat treated materials that do not react to air quenching, only a very narrow zone of annealing, as previously stated, will be found.

Friction sawing and high-velocity sawing are two distinct cutting techniques. The latter is a modern form of "actual" sawing requiring, as with conventional procedure, a decrease in saw velocity for any increase in material thickness, and the fundamental rule of chip production that friction generates heat and heat destroys temper still prevails. In short, the high-speed band sawing technique applies to all materials currently cut within the conventional speed range of 50-1500 fpm. With the high-speed technique, the former maximum of 1500 fpm is the minimum of a range extending to 5000 fpm. The light metals benefit to a large extent from this innovation, and for this reason the friction band (*Please turn to page* 208)

TABLE I—Typical Foundry Band Friction Sawing Applications on Stainless Steel

Description of Part	Weight Per Piece, Lb	Number of Pieces Per Casting	Number of Cuts Per Casting	Length of Cut	Thickness of Cut	Total Time, Minutes
Bibb Keys	½	4	4	⅞"	⅞"	.62
2" Couplings	3	4	4	1¼"	1½"	.89
1½" Couplings	2½	8	8	1"	1⅛"	.92
2" Cap Fittings	3½	4	4	1"	1½"	.79
Rings	1	2	2	1¾"	¾"	.28
Squeeze Machine Castings (Varying Cuts) 2	12	Open Head Ingate		⅞" 1¾"	⅞" 1½"	.33 .20
Tube Clamps	1	1	1	1"	¾"	1.58
Scrapers	3	2	2	1"	⅝"	1.02
Head Castings	2½	1	1	1½"	1½"	1.53
(Omitted)	3	2	4	¾"	¾"	1.02
Filter Leaves	2	2	2	1"	⅞"	.96

Note: Saw velocity for all cuts standardized at 12,000 fpm. Data courtesy Cooper Alloy Foundry Co., Hillside, N. J.

TABLE II—Typical Foundry High Velocity Band Sawing Applications

(Laboratory Tested Saw Control Factors)

TEST ONE

Material: Aluminum gates 1" thick
Recommendations:
Saw ½"—4 pitch
Velocity 3800 fpm
Feed Light
Lubricant Spray—80 drops per min
Results:
Cutting rate 30 sq in. per min
Finish Excellent

TEST TWO

Material: Aluminum risers 3" high
Recommendations:
Saw 1"—3 pitch
Velocity 1500 fpm
Feed Medium
Lubricant Spray—125 drops per min
Results:
Cutting rate 25 sq in. per min
Finish Very good
Remarks:
High percentage of silicon prevented raising velocity to 3000 fpm

TEST THREE

Materials:
Aluminum gates 2½" thick
Recommendations:
Saw 1"—3 pitch
Velocity 3400 fpm
Feed Medium
Lubricant Spray—120 drops per min
Results:
Cutting rate 23 sq in. per min
Finish Very good

TEST FOUR

Material:
Aluminum Castings 9" thick (trim)
Recommendations:
Saw 1"—2 pitch
Velocity 3100 fpm
Feed Hydraulic-medium
Lubricant Spray—2 oz per min
Results:
Cutting rate 40 sq in. per min
Finish Good
Remarks:
Kerf from previous method of cutting reduced from 5/16" to 1/16"

TEST FIVE

Material:
Magnesium castings 8" thick (radius cut)
Recommendations:
Saw ¼"—4 pitch
Velocity 3000 fpm
Feed Medium
Lubricant Spray—3 oz per min
Results:
Cutting rate 19 sq in. per min
Finish Very good

TEST SIX

Material:
Magnesium Risers 5" high
Recommendations:
Saw 1"—3 pitch
Velocity 3200 fpm
Feed Medium
Lubricant None
Results:
Cutting rate 22 sq in. per min
Finish Very good

Note: When band sawing magnesium dry, refer to the Dow Chemical Co. Bulletin D. M. 16b.

Questions AND Answers

Required Information Is Lacking

Q.—We have been casting gray iron and a special wear-resisting alloy iron for about 50 years. We recently have installed a new cupola and some other foundry equipment, and intend to start our experimentation to improve the quality of both mentioned irons. Can you give us a source from which we can obtain different analyses of irons which we can use to compare with our own? At the present time we use molybdenum in our alloy and in the past have tried nickel and even chromium. What we need are some proved mixes to use as the basis for our experiments.

A.—Your inquiry relative to gray iron and wear-resistant iron is difficult to answer in that you did not give any information on your present compositions and the specific types of castings (section thickness, etc.). However, we are sure that if you will communicate with the various firms supplying alloying and related materials to the foundry industry, they will supply you with practical information on the applications of those. From that you then can go ahead with any changes which based on your past experience, might result in improvement in your castings. We note that you are in the clayworking machinery field and undoubtedly will be interested in an alloy iron designed for abrasive resistance which is claimed to have many advantages. It contains 4 to 5 per cent nickel and 1 to 2 per cent chromium in addition to the usual elements.

Impact Breaks Aluminum Casting

Q.—We are sending you a fractured aluminum alloy casting which is used as a blade holder on a power lawnmower. This particular casting was broken when the mower hit a heavy chain. There have been a few other cases like this one and we would like to know whether or not you think it is faulty casting. Castings are made from scrap auto pistons and poured in sand molds. They are not heat treated, due to lack of facilities. In some instances the castings were used and broken two days after being cast. Customer insists on doing this at his own risk simply to keep orders filled.

A.—Examination of the fractured surface shows a rather coarse grain which, with the wave-like marks on the upper surface, indicate the possibility of pouring at too high a temperature. We also note a decided shrink at the hub section some 3 inches away from the fracture which usually would make the casting unacceptable. Fracture of the casting as well as on the surface bears indications of gassed metal. Hence, the casting is far from being sound. Therefore, we suggest that you look into your melting practice as well as the gating system and provide the necessary remedies.

We also believe that use of scrap pistons without remelting into ingots and analyzing for composition is not good practice. There are at least five different alloys used for making pistons which range from 0 to 10 per cent Cu, 0 to 12 per cent Si, 0.2 to 1.0 per cent Mg, not to mention other elements, and the possibility of producing melts of the same composition from scrap pistons alone is largely a matter of chance.

Since the casting, with its attached blade, revolves at rather high speed in a horizontal plane, the damage caused in striking a hard object, such as the chain link you mention, might be prevented by using a shear pin to attach the casting to the driving shaft. This arrangement is employed in marine outboard motors to prevent damage to the propeller if it strikes an underwater object. Another method might be to employ some type of spring clutch such as used in torque wrenches.

Find Small Shot in Gas Pockets

Q.—Recently we ran into what looks like clean gas pockets containing a metal bead. Some pockets are small, while several actually measured ½-in. across. We are forwarding a small sample from one of our castings and will appreciate your opinion on the cause of the phenomenon.

A.—The late Dr. Moldenke in his well known *Principles of Iron Founding*, chapter VI 2nd edition devotes several pages to a discussion of this subject. The following excerpts may serve your present purpose:

"These little globules of iron have been examined chemically by Ledebur and others. Analysis of the globule compared with that of the mother iron shows a big drop in silicon, lower sulphur, practically no change in manganese, but a marked increase in phosphorus, 0.44 per cent in the mother iron, and 1.984 per cent in the globule. Many foundrymen claim that the little globules found in interior cavities of castings are *shot* carried there by metal splashing in the mold. This view is not correct. Shot always is found on the surface of the casting or swept into a corner. Globules found in cavities with bright colored walls are attached at one point, indicating they have been exuded from the setting metal at the point of least resistance after the cavity had been formed by gas. (In an accompanying table the author shows the phosphorus content of five pig irons, and of the globules found in them. Each one shows a remarkable increase in the phosphorus content of the globules. For example No. 5, a high phosphorus Luxemburg pig iron shows 2.04 per cent phosphorus, while in a globule from the same iron the phosphorus content is 6.075 per cent).

"In open sand casting the disagreeable part of the situation is the reaction taking place between the ox-

ide of iron and the carbon in the molten metal. Gas is formed under a crust which prevents proper egress to the atmosphere. The gas puffs downward into the metal."

Plaster Molding for Aluminum

Q.—We have seen several references in THE FOUNDRY to plaster molds for pouring aluminum castings, and wonder if that process could be applied to a two-section aluminum hub for small wheels using 8 x 2-in. semipneumatic tires. The hub sections weigh approximately 12 oz, are 4½ in. outside flange diam with a center section of 1⅛ in. wide and 1½ in. diam. There are holes of various diameters in the center section to take bearings of different diameters. We use sand castings now, but they are not as smooth as we would like.

A.—The small aluminum wheel which you mention can be produced in a plaster or gypsum cement mold with an extremely smooth surface, provided the pattern also has a smooth surface. For production work wood patterns usually are not serviceable since they must be immersed in the liquid plaster until the plaster air sets, and also they usually are not smooth enough without special preparation in lacquering or coating and sanding. Brass patterns seem to be preferred.

Plaster mix is composed of 70 to 80 per cent plaster and 20 to 30 per cent fibrous talc which may be purchased separately and mixed, or purchased already mixed. From 120 to 180 parts by weight of water are added to 100 parts of the dry plaster mix to form the liquid material which is poured over the pattern. Plaster always is added to the water. After an air setting period in which the mold material changes from a liquid to a solid, the mold is removed from the pattern and dried in an oven at 400 to 1400°F from 2 to 12 hr. After the mold is dried, it is assembled and poured while still distinctly warm to the touch. Molds are not allowed to cool to room temperature as they tend to absorb moisture.

Those are the general steps in producing plaster molds, but a number of details such as suitable plaster compounds, proper mixing times, suitable coatings for patterns and flasks to obtain good separation of the plaster mold, and other information should be secured from the manufacturers of casting plaster.

Claims Castings Hard To Machine

Q.—We are making a gray iron casting with a Si range from 2.20 to 2.50 per cent. Occasionally the Si gets as high as 2.77 per cent, and the purchaser rejected them, stating that the high Si made them hard to machine. Other properties, including the brinell hardness, met specifications. We are of the opinion that the higher Si makes a more machinable casting. What is your opinion?

A.—In general your remark that higher Si in the range mentioned should provide better machinability agrees with the consensus, and we doubt seriously that the purchaser's reason for rejection was sound. Presumably difficulty in machining was true, but the question is, what is the particular trouble. For example, it is quite possible that in heavier section castings, open grain structure in some spots adjacent to close grain structure will result in tool chatter—the tool sinking into the softer structure and catching at the somewhat harder, close-grain structure. Many machinists would attribute such tool chatter to hard iron or hard spots.

Again in thin sections one might run into hard edges from the sand being a little too wet, etc. Then, of course, there is the question of whether the Si content actually is high in the castings. It might be well for you to find out exactly what the machining trouble is, and take the necessary steps to satisfy the customer's demands if they are reasonable. Take some of the rejected castings, and have them machined elsewhere. It also is possible that the machining methods are at fault.

Holes Appear in Iron Castings

Q.—We are sending you a gray iron gear blank and part of a rack which were made in our foundry, and would appreciate your opinion as to what causes the holes and honeycomb appearance. This form of defect shows up quite frequently—sometimes on the surface and other times internally where it is not discovered until the casting is machined. We are using a ratio of six parts of pig iron to four parts scrap iron.

A.—In our opinion the holes and honeycomb in the samples submitted for consideration are blows resulting probably from generation of steam or other gases in the areas where they occur. Possibly the trouble may arise from poor sand mixing which does not give uniform distribution of moisture. Again it might be from the presence of a piece of wood or other material at the face of or close to the face of the cavity or it might be from patching the edges. Another

GANGWAY!

By J. A. PATTERSON

"Ya got me, boss—it happens every time with this new man!"

Questions AND Answers

possible cause is hard ramming at those points, and last but not least is too heavy use of the swab when drawing the pattern in hand molding.

Holes just under the skin of the casting may be caused by mold gases or gases in the iron. The former occur when the metal is still liquid enough to form a skin at the mold face after gas generation has ceased, and the holes usually are dull and discolored on the interior. Pinholes from gassy metal due to poor melting or use of wet ladles generally have bright interiors.

Gases Lack Escape at Mold Bottom

Q.—We are sending for your examination a gray iron casting which exhibits a defect which appears from time to time in our foundry. We use a cupola lined to 54 in. with 2000-lb charges, 300-lb coke splits and 48-in. bed. Sand contains 5½ to 6½ per cent moisture, 14 per cent clay, 85 permeability, 8 to 10 psi green strength and 70 mold hardness.

A.—In our opinion the defect observed, a number of holes on the exterior and on the interior, are blows presumably caused by moisture or gases. It appears that the exterior blows are on the drag side of the casting, and possibly the trouble might result from the gases not being able to escape freely due to too tight a fit between a solid bottom board and flask. The gases could sneak in at the joint between mold and core to cause the holes on the interior adjacent to the point of entry.

Producing Cast Steel Bushings

Q.—We are called upon to cast bushings of 0.50 carbon steel with 1 per cent chrome in sizes ranging from 9 to 18 in. OD, 18 to 30 in. long, and wall thickness from 1¼ to 2 in. These do not offer any particular difficulty except that they must be perfectly clean and free of any inclusion on the outside wall. Bushings subsequently are hardened and machined after hardening; therefore defects on the surface cannot be welded on account of the difference in hardness of weld metal. We made sample castings horizontally but found considerable inclusions in the cope, and intend to cast them on end in the future. We will appreciate your advice on the best gating, and since this may run into quite a production job, can you give us any information on static casting in permanent molds or centrifugally casting in sand or metal molds.

A.—We do not believe it would be economically feasible to cast the bushings you mention in permanent molds by static methods. If there is enough business in sight to justify spending the money for centrifugal machines, that method would be well suited to the job.

Bushings would be cast in a horizontal position; the lining of the mold consisting of a good oil or dry sand either as a core or rammed against a suitable pattern. Size of the heat of steel is not given, but supposing that it is not under 1000 lb, several machines will be required since the wall thickness of the castings is sufficient to make their cooling time too long to permit more than one casting to be poured in each machine from a single heat of steel. The advantage to be secured from centrifugal pouring of these castings is a very high yield of metal in ladle to finished casting, and the possibility of producing castings free from "center-line" shrinkage which is not so easy to avoid in static pouring.

If the castings are to be poured in static molds, they should be molded to cast on end with a gate that enters the mold at the bottom, and set so as to send the steel into the mold in a tangential direction. That is known as a swirl gate which causes the steel to rotate in the mold as it fills up, and prevents loose sand and dirt from adhering to the sides of the mold. Simplest form of sink head then is a prolongation of the entire casting so that the mold consists of a drag and a cheek; the inside wall of the bushing being formed by a central core set in the drag and held down by a wedge driven between the top of the core and a bar across the cheek flask.

If it is necessary to avoid center-line shrinkage, the thinner castings will have to be cast with a tapering wall and machine off the excess metal. In the case of castings with the thinnest walls, such as those 1¼ in. thick and 18 in. high, published data indicate that the padding must amount to as much as 3 in. if centerline shrinkage is to be eliminated completely. Extent of padding necessary however, can be reduced greatly by using flat bar chills in the lower portion of the center core, separated by their own width of sand, and extending to perhaps one-fourth the height of the casting.

Castings Are Chilled on Edge

Q.—We are forwarding for your inspection two pieces of gray iron broken from the outer edge of a disk ⅜-in. thick and 18-in. diam. The casting machines readily except on the outside edge where patches of metal are chilled white to a depth of ⅜-in. Most of our castings are hard and also show shrinkage areas. We have been using all scrap in the cupola charge for the past week. Previously, even with the addition of a certain amount of pig iron the castings were hard and shrunken; not quite as bad as with all scrap charges. We use silicon briquets in the cupola and ground (pea size) in the ladle. Analysis of the pig iron shows: Si 2.85 per cent, S 0.034 per cent, P 0.85 per cent, Mn 0.47 per cent. The usual charge contains 300 lb pig iron, 400 lb scrap and 90 lb coke. The coke bed is 46-in. high in a 36-in. diam, cupola. We shall appreciate advice on how to produce good, soft castings free from shrinkage defects.

A.—Production of sound, clean machinable castings, free from internal or external shrinkage or other form of defect, is the aim and ambition of every foundryman. Those who succeed are governed mainly by a recognition of two factors: (a) Iron in the casting bears a definite relationship to the iron in the cupola charge, and (b) iron perfectly satisfactory in a thick casting will not present a gray fracture in thin casting. To put it another way, the condition of the casting depends on the analysis and the cooling rate.

To consider your particular problem from a brief

(*Concluded on page* 102)

INCO OFFERS EXPERIENCED COUNSEL ON METAL PROBLEMS

Avail yourself of experienced counsel on problems relating to the properties, treatment, fabrication or performance of ferrous and non-ferrous metals containing nickel.

We offer consultation . . . and invite you to write, wire or phone the INCO Technical Field Section or Stock and Service Center nearest to your plant.

"INCO" TECHNICAL SECTIONS

Consultation on technical problems relating to alloys containing nickel is invited. Consult the nearest Technical Field Section of INCO Development and Research Division listed below:

CANADIAN SECTION
25 King Street, West,
Toronto 1, Ont.
Tel. Elgin 7471

CENTRAL ATLANTIC COAST SECTION
67 Wall Street,
New York 5, N. Y.
Tel. Whitehall 4-1000

CHICAGO SECTION
333 N. Michigan Avenue,
Chicago 1, Ill.
Tel. Franklin 4030

CINCINNATI SECTION
Carew Tower,
Cincinnati 2, Ohio
Tel. Parkway 1632

DETROIT SECTION
General Motors Building,
Detroit 2, Mich.
Tel. Madison 3436

EMPIRE STATE SECTION
Genesee Valley Trust Bldg.,
Rochester 4, N. Y.
Tel. Main 2393

NEW ENGLAND SECTION
75 Pearl Street,
Hartford 3, Conn.
Tel. Hartford 7-0383

PITTSBURGH SECTION
Grant Building,
Pittsburgh 19, Pa.
Tel. Atlantic 9546

ST. LOUIS SECTION
Ambassador Bldg.,
St. Louis 1, Mo.
Tel. Garfield 4197

TEXAS SECTION
Commerce Bldg.
Houston 2, Texas
Tel. Charter 4-4234

TWIN CITIES SECTION
Northwestern Bank Bldg.,
Minneapolis 2, Minn.
Tel. Geneva 0631

WEST COAST SECTION
Petroleum Bldg.,
Los Angeles 15, Calif.
Tel. Prospect 2496

STOCK AND SERVICE CENTERS FOR "INCO" PRODUCTS

The following are sources of supply for primary nickel for alloying purposes. Through casting specialists, they are prepared to offer technical service on the production of ferrous and non-ferrous castings containing nickel.

ATLANTA 3
J. M. Tull Metal & Supply Co.
285 Marietta Street
Tel. Walnut 3525

BALTIMORE 17
Whitehead Metal Products Company, Inc.
413 West North Avenue
Tel. Lafayette 2300

BUFFALO 2
Whitehead Metal Products Company, Inc.
254 Court Street
Tel. Cleveland 1475

CAMBRIDGE 39, MASS.
Whitehead Metal Products Company, Inc.
281 Albany Street
Tel. Trowbridge 6-4680

CHICAGO 23
Steel Sales Corporation
3348 South Pulaski Road
Tel. Bishop 7700

CINCINNATI 14
Williams and Company, Inc.
1921 Dunlap Street
Tel. Cherry 4700

CLEVELAND 14
Williams and Company, Inc.
3700 Perkins Avenue
Tel. Express 7000

COLUMBUS 15, OHIO
Williams and Company, Inc.
31 North Grant Avenue
Tel. Main 3291

DALLAS 9
Metal Goods Corporation
6211 Cedar Springs Road
Tel. Dixon 4-3925

DENVER 2
Metal Goods Corporation
817 Seventeenth Street
Tel. Main 9030

DETROIT 10
Steel Sales Corporation
5151 Wesson Avenue
Tel. Tyler 6-3000

HOUSTON 3
Metal Goods Corporation
711 Milby Street
Tel. Beacon 3-8881

INDIANAPOLIS 2
Steel Sales Corporation
1916 North Meridian Street
Tel. Talbot 8-1506

KANSAS CITY 2, MO.
Steel Sales Corporation
39th & Main Streets
Tel. Jefferson 1080

LOS ANGELES 21
Pacific Metals Company, Ltd.
1400 South Alameda Street
Tel. Prospect 0171

MILWAUKEE 4
Steel Sales Corporation
647 West Virginia Street
Tel. Daly 8-6840

MINNEAPOLIS 15
Steel Sales Corporation
529 South 7th Street
Tel. Nestor 6614

MONTREAL 3
Robert W. Bartram, Limited
277 Duke Street
Tel. Marquette 3281

NEWARK 5
Whitehead Metal Products Company, Inc.
205 Frelinghuysen Avenue
Tel. Bigelow 8-8500

NEW HAVEN 13
Whitehead Metal Products Company, Inc.
265 Church Street
Tel. New Haven 8-0275

NEW ORLEANS 12
Metal Goods Corporation
432 Julia Street
Tel. Canal 7373

NEW YORK 14
Whitehead Metal Products Company, Inc.
303 West 10th Street
Tel. Watkins 4-1500

PHILADELPHIA 40
Whitehead Metal Products Company, Inc.
1955 Hunting Park Avenue
Tel. Baldwin 9-2323

PITTSBURGH 12
Williams and Company, Inc.
901 Pennsylvania Avenue
Tel. Cedar 8600

PORTLAND 4, ORE.
Eagle Metals Company
809 Dekum Building
Tel. Atwater 4962

ROCHESTER 4
Whitehead Metal Products Company, Inc.
217 East Avenue
Tel. Stone 3093

ST. LOUIS 10
Steel Sales Corporation
4565 McRee Avenue
Tel. Grand 5255

SALT LAKE CITY 1
Pacific Metals Company, Ltd.
34 Richards Street
Tel. Salt Lake City 4-7058

SAN FRANCISCO 10
Pacific Metals Company, Ltd.
3100 Nineteenth Street
Tel. Mission 7-1104

SEATTLE 4
Eagle Metals Company
3628 East Marginal Way
Tel. Eliot 4764

SPOKANE 8
Eagle Metals Company
328 West Trent Avenue
Tel. Main 2419

SYRACUSE 3
Whitehead Metal Products Company, Inc.
201 Burt Street
Tel. Syracuse 5-4112

TOLEDO 2
Williams and Company, Inc.
650 East Woodruff Avenue
Tel. Adams 8102

TORONTO 5
Alloy Metal Sales Limited
881 Bay Street
Tel. Midway 7335

TULSA 3
Metal Goods Corporation
302 North Boston Street
Tel. Tulsa 4-1175

VANCOUVER, B. C.
Wilkinson Company, Ltd.
190 West Second Avenue
Tel. Fairmount 6101

EMBLEM OF INCO SERVICE
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

Questions AND Answers

(*Concluded from page* 100)

practical angle it is fairly reasonable to assume that your iron is on what might be termed the border line, susceptible to chill under slight provocation. One of two causes may be responsible: (a) Carbon and silicon content may be too low to secure the proper analysis in the castings according to mass or thickness, or (b) you are not adding a sufficient quantity of silicon to the charge. On this second count a possibility exists that the silicon added to the metal in the ladle is not completely mixed and absorbed. This latter suspicion is suggested by the fact that the chilled area on the edge of the casting is not uniform. The suggested remedy is to increase the amount of silicon in charge and ladle. Stir the metal vigorously in the ladle. Place two or three old electric furnace electrodes in the bottom of the coke bed.

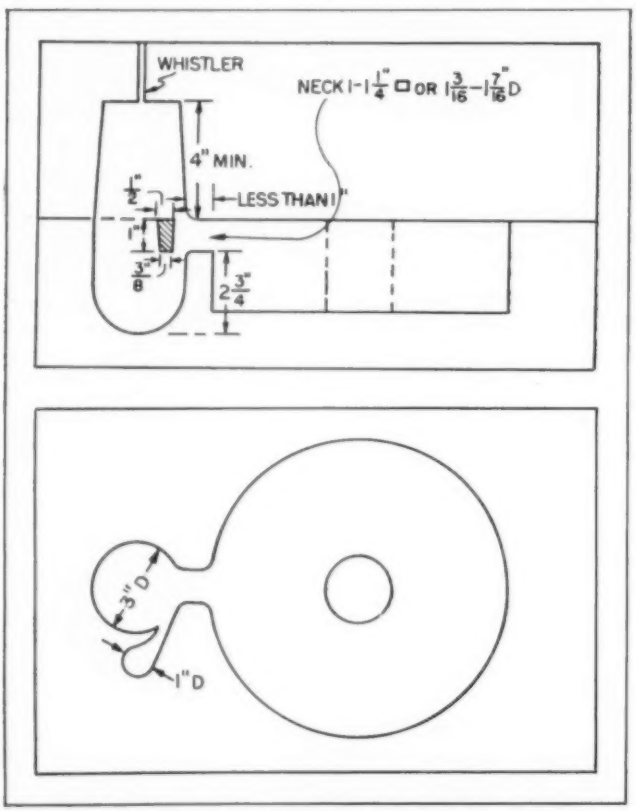
Trouble Is Due to Lack of Feed

Q.—We are casting gear blanks and jaw clutch parts with which we are having difficulty with holes under the cope side surface which are not revealed until a machine cut is taken. Iron is poured hot from a mixture using 10 per cent pig and the remainder light section machinery scrap and heavy stoveplate scrap. Castings machine well with no hard spots. Gear blanks are 10 in. in diam with a 2-in. bore. Castings are gated in the drag, and on one side with three branches from the sprue with a 2-in. riser 6 in. high on the opposite side. With blanks up to 1¼ in. thick we do not have trouble, although there is some evidence of honeycomb. Jaw clutch part is about 3 in. thick with a hole through center.

A.—Without specimens to examine, we are at loss to determine definitely whether your trouble from holes under the surface arises from lack of feed, or is due to blows caused by the sand being a little too tight for the heavier section castings. However, you can ascertain whether it is the latter by using the vent wire freely on the cope, and see that the vent from the dry or green sand core forming the bore reaches the exterior of the mold without obstruction.

Our own opinion is that your trouble mainly is lack of feed resulting in shrinks. While you do not mention the sizes of the gates or the connection between casting and risers, we believe that they are too small and freeze off before the casting is completely solid. We feel that better results in feeding are obtained where the hot metal enters the casting from the riser, and suggest that you change your method to that indicated in the accompanying sketch which was described rather fully by Winte and Barlow in the August, 1945 issue of THE FOUNDRY. You will note that the connection from the riser to the casting is of good size, and short. The latter is important since it is necessary to create a hot spot at that point to insure that the connection will remain open until the casting freezes.

Winte and Barlow also point out that the success of the method involves the extension of the shrink-bob or riser at least 4 in. above the highest point of the casting cavity, and that it extends below the lowest point of the connecting neck to the casting, for a reasonable distance based on the shrink-bob diameter. Full data on the dimensions which have been found successful are presented in the article. As indicated in the sketch, the runner from the sprue to the shrink-bob is arranged to enter the latter tangentially to provide a swirling action of the metal.



Suggested method for gating of gear blank which employs a suitable blind riser through which the metal flows into the casting

Proper Care for Permanent Mold

Q.—We are in search of information regarding use and care of a permanent mold. We plan to have one in our shop very soon and would like to know all the necessary details to insure proper care.

A.—So far as we know there are no standards set up on care of permanent molds—each shop developing procedures suitable for its own operations. Of course, the main essential is to see that the mold coating is maintained, not only for protection of the mold surface, but also to obtain the proper directional solidification of the casting. In some types of molds the coating is applied once a day; in other several applications may be required, and in others the coating must be renewed at specific points from time to time. If metal cores are used they must be cooled, usually in graphite-bearing solution. Operating cycle of the mold and data on mold coating are obtained by pilot work, and those should be adhered to as closely as possible during production operation to obtain the best castings and longest mold life.

Or from castings to ball races, billets to bits — whatever your grinding wheel problem is—a U.S. Royalite Wheel can handle it.

U. S. Rubber technicians can precisely engineer each wheel to your specifications. And whenever your operating conditions change, very often these specialists can *quickly* fill specifications never before demanded in a grinding wheel.

Research and experience are the backbone of U. S. Rubber success... research that covers not only bonds and abrasives, but also related fields served by the products of U. S. Rubber. This has been going on for over 85 years.

Moreover, your actual operating costs can be told in *advance*, by means of tests right in your own plant.

For complete information, write to Mechanical Goods Division, United States Rubber Company, Fort Wayne, Indiana.

U. S. ROYALITE GRINDING WHEELS

Engineered to Your Job

MADE ONLY BY

U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Men OF INDUSTRY

ALEXANDER D. BARCZAK, formerly vice president, Bardes Forge & Foundry Co., Cincinnati, has been named plant manager, Superior Foundry Inc., Cleveland. Mr. Barczak received a degree in engineering from University of Detroit in 1935. While there he did co-operative work at Chevrolet Gray Iron Foundry, Saginaw, Mich., in the coremaking department, pattern shop and laboratory. He remained at Chevrolet for 7 years, where he was engaged chiefly in sand control problems and work in the laboratory. During the war years he conducted an evening foundry course at Saginaw High School under the National Defense Program. In 1942 Mr. Barczak joined Bardes Forge & Foundry Co. Cincinnati, as metallurgist in charge of metal and sand control; he became foundry superintendent a year later, plant manager in 1944, and vice president in 1946. Mr. Barczak was elected to serve as chairman of the Cincinnati District Chapter of the American Foundrymen's Society for the current year, prior to his change of residence to Cleveland in his new position.

♦ ♦ ♦

Walter E. Sicha, elected president of the Northeastern Ohio Chapter of the American Foundrymen's Society, is an assistant chief of the Cleveland Branch, Aluminum Research Laboratories, Aluminum Co. of America. Mr. Sicha, a graduate of Case Institute of Technology, took his master's degree in metallurgical study and research from University of Michigan in 1929. He entered the general technical department of the Aluminum Co. of America, Cleveland, at that time, and in 1941 became superintendent of its magnesium sand foundry, Bridgeport, Conn. Later he was appointed resident metallurgist, Aluminum Research Laboratories of the company, Cleveland, and became one of its assistant chiefs early this year. Mr. Sicha was elected vice president of the Northeastern Chapter of the AFS for 1948-49, but succeeds Elmer C. Zirzow as president, the latter recently having joined Deere & Co., Moline, Ill. Mr. Sicha is active in the work of the AFS, and is a member of its Aluminum and Magnesium Division executive committee.

♦ ♦ ♦

Carl H. Morken has formed C. H. Morken & Associates, with headquarters at 1836 Euclid Ave., Cleveland, to engage in the sale of foundry equipment and the design of production patterns and coreboxes. Equipment manufacturers represented by the new company in parts of Pennsylvania, Ohio and Indiana include SPO Inc., Buehler Ltd., the Campbell-Hausfeld Co., Harry W. Dietert Co. and Pittsburgh Lectromelt Furnace Corp. Mr. Morken recently was executive general superintendent of the Centrifugal Casting Co. Inc., Bluffton, Ind., and previously was associated for nearly 10 years as sales manager and later general superintendent of the Carondelet Foundry Co., St., Louis. Prior connections, following his graduation from the University of Minnesota in 1922, included the Detroit Electric Furnace Co., Detroit, and the Ohio Brass Co., Mansfield, O. During the recent war Mr. Morken served as technical consultant on the staff of the chief of ordnance, War Department. He is a past chairman of the St. Louis District Chapter, AFS.

♦ ♦ ♦

John H. Owen has been appointed Chicago district sales manager, Harbison-Walker Refractories Co., Pittsburgh. Mr. Owen joined the St. Louis district sales office more than 20 years ago and later was transferred to the Chicago sales office where he has served in various capacities.

♦ ♦ ♦

Henry M. Harrold has been named vice president of operations, Bridgman Castings Inc., Bridgman, Mich., subsidiary of Hannifin Corp., Chicago. Early this year Mr. Harrold joined the Bridgman organization, a producer of gray iron castings. Previously he was associated with Sperry Gyroscope Co., Great Neck, N. Y., and Caterpillar Tractor Co., Peoria, Ill.

♦ ♦ ♦

Donald B. Phillips, until recently foundry superintendent, Lobdell-Emery Mfg. Co., Alma, Mich., has acquired the foundry equipment and supplies of that company and has organized Phillips Mfg., 720 Michigan Ave., Alma, for the production of aluminum permanent mold castings. Mr. Phillips was graduated from Michigan State College in 1934. From 1937-1941 he was associated with the standards department, Chevrolet Gray Iron Foundry, Division of General Motors Corp., in Saginaw, Mich. For

(*Continued on page* 106)

ALEXANDER D. BARCZAK

WALTER E. SICHA

CARL H. MORKEN

JOHN H. OWEN

Our Own Source of Coal

Our Own Source of Ore

Our Own Coking Plant

Our Own Control of Operations

WOODWARD PIG IRON

America's largest completely independent and entirely integrated merchant iron producer.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1883

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 104)
the following 5 years he was foundry process engineer, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind. He joined Lobdell-Emery Mfg. Co. in 1946 as assistant superintendent and became foundry superintendent the following year.

♦ ♦ ♦

Appointments within the organization of the George Haiss Mfg. Co. Inc., division of Pettibone Mulliken Corp., New York and Chicago, have been announced for the sale and service of the company's new and redesigned line of material handling conveyors, car unloaders and loaders. **H. D. Williams** has been appointed representative in eastern Pennsylvania and southern New Jersey, with headquarters in Philadelphia. Mr. Williams was graduated from Maine University with a degree in civil engineering. His brother, **Ed Williams,** will continue to direct sale of parts, servicing and maintenance of company equipment in that territory. **John F. Day** has been appointed to cover the northwestern sections of New York and Pennsylvania, with headquarters in Buffalo. **J. Benatar** has been appointed sales representative in the five boroughs of New York, with headquarters in Brooklyn. The new appointees have had many years of experience in the sales, application and servicing of material handling equipment.

♦ ♦ ♦

J. P. Bankson has been named assistant to the vice president, Harbison-Walker Refractories Co., Pittsburgh. Mr. Bankson was graduated from Yale University in 1922, and was associated with General Refractories Co. for 8 years. He joined the Cleveland office of Harbison-Walker as a salesman in 1930, and was transferred to the Pittsburgh headquarters in 1935, as district sales manager, where he served until his new appointment. **Harold S. Dunn,** formerly sales manager of the Portsmouth, O., district, succeeds Mr. Bankson as Pittsburgh district sales manager. Mr. Dunn attended Ohio Wesleyan University where he remained until 1925, as an instructor in the School of Business Administration. He entered the Portsmouth Works of Harbison-Walker at that time, became district sales representative in 1926, and district sales manger there in 1932.

♦ ♦ ♦

Robert J. Powell has been appointed refractory sales engineer in Alabama, Tennessee and western Georgia and Florida, for Babcock & Wilcox Co., New York, with headquarters in Atlanta. **A. Dawson Teague,** whose office is in Augusta, Ga., will continue as refractory sales engineer for North and South Carolina and eastern Georgia and Florida. Mr. Powell received his engineering education at Georgia Institute of Technology and has had nearly 15 years of experience in the production and sales of refractories for the company.

♦ ♦ ♦

S. T. Jazwinski, chief metallurgist, Barium Steel Corp., and vice president of its subsidiary, Sheffield Iron & Steel Co., Sheffield, Ala., has been named vice president, Detroit Steel Casting Co., Detroit, another Barium Steel subsidiary. Dr. Jazwinski has served in executive metallurgical and foundry capacities in Poland, England and Brazil, prior to joining Barium Steel in 1946.

♦ ♦ ♦

John A. Meyer, National Alloy Steel Division, Blaw-Knox Co., Pittsburgh, will assume the duties of president of the Pittsburgh Foundrymen's Association for the 1948-49 term in the absence of **C. B. Dick,** who has been transferred to East Springfield, Mass., as works manager of the Westinghouse Electrical Appliance Division there. Mr. Meyer had previously been elected vice president of the association. He will be succeeded in that capacity by **R. G. Schaefer,** Schaefer-Goodnow Foundries Inc., Pittsburgh. **E. P. Buchanan,** Pittsburgh Coke & Chemical Co., is secretary-treasurer of the group.

♦ ♦ ♦

W. W. Sieg, formerly executive vice president, has been elected president, Titan Metal Mfg. Co., Bellefonte, Pa. Mr. Sieg was graduated from Pennsylvania State College, and joined the company in 1929 as a metallurgist. Previously he had been employed by Ingersoll-Rand Co., Phillipsburg, N. J., and Rome Brass & Copper Co., Rome, N. Y. **W. P. Sieg,** former president, has been appointed vice chairman of the board of directors and chairman of the executive committee.

♦ ♦ ♦

Arthur J. Tuscany, executive secretary, Foundry Equipment Manufacturers Association, Cleveland, has been elected chairman of the Cleveland District Council of the American Society for Testing Materials for a two-year term. **R. T. Bayless,** assistant secretary of the American Society for Metals, has been chosen vice chairman of the council, and **H. P. Ferguson,** chief of the refining control division, Standard Oil Co. of Ohio, has been elected secretary.

♦ ♦ ♦

A. C. Monteith has been elected vice president in charge of engineering and research, Westinghouse Electric Corp., Pittsburgh, succeeding **Marvin W. Smith,** who has been elected executive vice president, Baldwin Locomotive Works, Philadelphia. Mr. Monteith has been associated

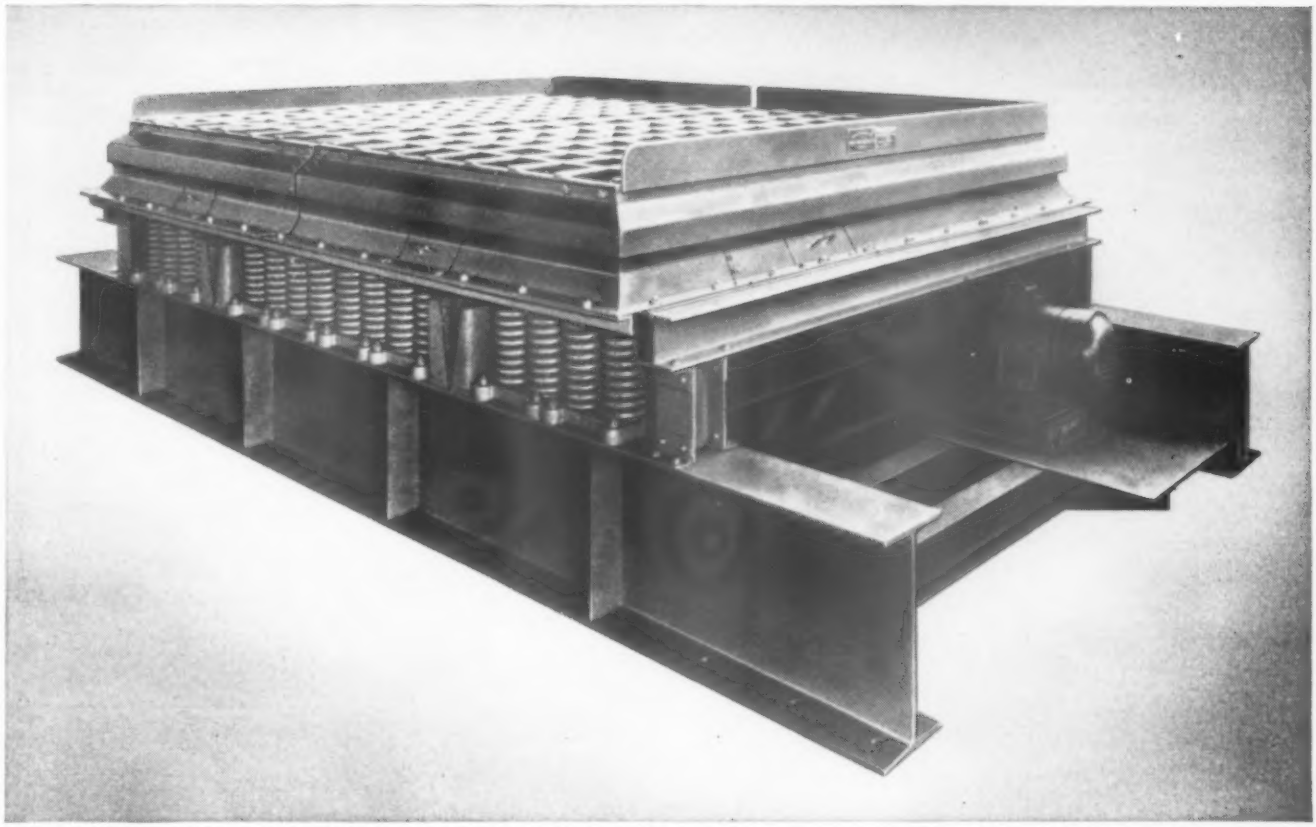
(*Continued on page* 110)

J. BENETAR

JOHN F. DAY

H. D. WILLIAMS

ED WILLIAMS



"Fit as a fiddle"... after 4 hard years!

Heavy-duty long-hour war production fails to knock out Robins Floatex Shakeout

The owner, a foundry man for many years, could scarcely believe his eyes!

He inspected his 34-ton dual-unit, 10′ x 12′ Robins Floatex Shakeout after four years of service that included long hours of heavy-duty war-production work. To his amazement it was "fit as a fiddle!"

Wear was practically negligible. His original equipment—including decks, springs and shafts—went right back into service. As a precaution, he replaced two bearings, although they still had not reached the end of their useful life.

Such long service with low maintenance expense is typical of Robins Floatex Shakeouts. You can find hundreds of such examples in foundries all over the country. There are good reasons why.

You see, only the Robins Floatex Shakeout is genuinely *full*-floating. The horizontal vibrating deck is supported on soft, heavy-duty coil springs which prevent impact-damage to mechanism or castings. They also reduce your power requirements to a minimum. And they keep vibration from being transmitted into supporting structures. The Floatex shakes the flask, not the building!

More than that, only the Robins Floatex Shakeout has a stroke *adjustable to castings of practically any size*—from an ounce or two to 100 tons or more. You can easily and quickly adjust a Floatex that has been handling mammoth castings to handle small, light, fragile castings without damage!

Yes . . . every Robins Floatex Shakeout is designed for long, hard, dependable service. So, why not have your equipment "fit as a fiddle" in the years to come? Let a Robins engineer show you how. Write for full particulars.

SEND TODAY for your copy of Robins Bulletin 124-A. Illustrates and describes money-saving features and advantages of full-floating Floatex Foundry Shakeouts. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey.

ROBINS CONVEYORS DIVISION...Hewitt-Robins Incorporated, Passaic, New Jersey

HEWITT-ROBINS INCORPORATED

ROBINS
FLOATEX SHAKEOUTS

STATIONARY PORTABLE SELF-DISCHARGING

3 TYPES DESIGNED TO HELP YOU 6 WAYS:

1. Save Time
2. Reduce Labor
3. Help Sand Recovery
4. Cool Hot Sand
5. Minimize Flask Breakage
6. Improve Working Conditions

At Left: 66" Wheelabrator Swing Table at Arcoson Foundry, Inc., Kenosha, Wis., "cleans castings with annealing scale better and faster", in the words of their superintendent.

Below: The ever popular 27" x 36" Wheelabrator Tumblast . . . a 5 cu. ft. mill. . . . cleans 200 pound loads of grey iron castings in 4 minutes at Marrin Foundry Co., Minneapolis.

Wheelabrator SWING TABLES

Wheelabrator Swing Tables are designed for plants needing a moderately priced machine capable of handling a wide range of large and small pieces. Five sizes are available with single work tables 24", 48", 66", 72" and 86" diameter. Write for Catalog 214A which describes these models fully.

Wheelabrator TUMBLASTS

Wheelabrator Tumblasts are extensively used for low-cost, speed cleaning of a wide variety of compact pieces that are sufficiently rugged to withstand a gentle tumbling action. They are made in eight standard sizes from one to 63 cu. ft. capacity for blast cleaning quantities of work in which individual pieces vary in weight from a fraction of an ounce up to hundreds of pounds. Write for literature.

WHEELABRATOR®

makes cleaning dollars go farther . . . for small foundries too

The remarkable economies of "Wheelabrator" airless abrasive blast cleaning are not restricted to large installations. Of the more than 5000 Wheelabrators now in use, a great number are in small foundries, some pouring as little as two or three tons daily. Yet even in operations of this scale, the right Wheelabrator for the job proves profitable. Let's let these foundry case histories speak for themselves:

1 cupola—2 tons daily—$20.00 a day savings are being realized by Craftools, London, Ont. with their 27" x 36" Wheelabrator Tumblast which is cleaning grey iron castings.

1 cupola—3 tons daily—"The 27" x 36" Wheelabrator Tumblast has been giving us excellent service. Our castings are cleaner, especially where we have small, deep pockets. Our customers have remarked about the improved appearance. Subsequent operations are moved up earlier and most shipments go out the same day" . . . Kline Hardware Co., Allentown, Pa.

1 cupola—4 tons daily—When a 36" x 42" Wheelabrator Tumblast was installed at Hillsdale Foundry Co., Hillsdale, Mich., it faced a two-week accumulation of uncleaned castings. Half of this was Wheelabrated the first day and the owner said the machine turned out more and better work than they could have done in a week with the two tumbling mills formerly used. He was surprised at the quietness and cleanliness of the machine and said it was the best investment he had ever made.

2 cupolas—6 to 8 tons daily—"We believe we are probably the smallest shop employing the Wheelabrator (a 36" x 42" Tumblast) as we have only the capacity for about fifteen molders on light work, but we were forced to use the Wheelabrator because our big competitors offer this finish and in order to compete we had to be able to give it. We feel that we have definitely improved our competitive position in the industry by being able to offer the customer a Wheelabrated finish without having it cost us a great deal of money." Hirshheimer Foundry, LaCrosse, Wis.

These same advantages can be yours. To help you in the selection of the right machine for the job, the services of American engineers are at your disposal. In the meantime write for Catalog 74-A "The Airless Wheelabrator, What It Is—What It Will Do".

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. BYRKIT ST., MISHAWAKA 2, IND.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

WHEELABRATOR BRINGS YOU THESE ADVANTAGES

- HIGH-SPEED CLEANING—reduces costs; speeds up shipment of orders.
- CUTS CLEANING COSTS up to 50% and more, because: it is faster; saves power up to 80%; saves labor; saves time in loading and unloading; saves space; saves abrasive; saves on operating and maintenance costs.
- REMOVES ALL TRACE OF SAND AND SCALE down to the virgin metal, with the result that:
  - Machining and grinding are faster.
  - Tools last longer.
  - Inspection is simplified.
  - Hardness readings are accurate.
- IMPROVED APPEARANCE — Wheelabrated products are bright, silvery, and uniformly clean.
- PROVIDES PERFECT BOND for final finishing such as enameling, plating, gavanizing, painting, etc.
- PRODUCES WIDE RANGE OF FINISHES from fine to coarse.
- HANDLES WIDE RANGE OF WORK — from fine springs to heavy armor plate. Ideal for special and unusual applications.
- ELIMINATES CHIPPED AND ROUNDED CORNERS — only a minimum amount of stock need be allowed for finish machining.

(*Continued from page* 106)

with Westinghouse for 25 years. In 1945 he took over the dual position of manager of headquarters engineering departments and director of education. **Carrol B. Dick,** manager of the Feeder Division at East Pittsburgh, Pa., has been appointed works manager of the company's Appliance Division, East Springfield, Mass. Mr. Dick succeeds **James R. Weaver,** who has joined Baldwin Locomotive Works, under Marvin W. Smith. Mr. Dick joined the East Pittsburgh plant in 1918 and served successively as inspector, foreman and superintendent. He was appointed manager of manufacturing for the Feeder Division in 1943 and manager in 1945. Mr. Weaver was formerly assistant works mechanical engineer at East Pittsburgh and has headed production activities for 8 years at the East Springfield plant.

♦ ♦ ♦

Hobart C. McDaniel has been appointed manager, technical press service, public relations department, Westinghouse Electric Corp., Pittsburgh, succeeding **Carl E. Nagel** who has become associated with McGraw Hill Book Co., New York. Mr. McDaniel was graduated from Oregon State College in 1926 and joined Westinghouse in 1939 as commercial engineer in the Bloomfield, N. J., Lamp Division. In 1943 he entered the technical press service of the company in the Pittsburgh office. In his new position he will be responsible for the company's publicity in the technical and trade magazines.

♦ ♦ ♦

Joseph W. Farley has been appointed manager of sales, miscellaneous steel castings, McConway & Torley Corp., Pittsburgh. Mr. Farley will head miscellaneous steel casting sales for the company's Pittsburgh plant and for its subsidiary, the Baltimore Foundry & Machine Co., Baltimore. Prior to joining McConway & Torley, he was associated with Chester Electric Steel Co., Chester, Pa., the Fort Pitt Steel Castings Co., McKeesport, Pa., and the Lobdell Co., Wilmington, Del.

♦ ♦ ♦

Jack R. Gregson has been appointed eastern territory district sales manager, bucket department, Wellman Engineering Co., Cleveland, with headquarters in New York. Mr. Gregson was graduated from Duke University with a degree in engineering. He was formerly sales engineer for Lima Shovel & Crane Division, Lima Locomotive Works, Lima, O., and assistant director of foreign operations of the same division when the company became known as Lima-Hamilton Corp.

♦ ♦ ♦

Francis C. Frary, director of research, Aluminum Co. of America, Pittsburgh, has been elected to receive the 1948 Gold Medal of the American Society for Metals. The medal, which is awarded for outstanding metallurgical knowledge and great versatility in application of science to the metal industry, will be presented during the National Metal Congress and Exposition, to be held in Philadelphia Oct. 25-29. Dr. Frary is widely known for his specialized studies in metallurgy and chemistry.

♦ ♦ ♦

J. A. Wettergreen has been appointed assistant to the president of the Monighan Division, Chicago plant of the Bucyrus-Erie Co., South Milwaukee, Wis. Mr. Wettergreen was formerly foundry superintendent, General Electric Co., Schenectady, N. Y. An active member of the Eastern New York Chapter of the American Foundrymen's Society, he served as its first secretary-treasurer when it was organized last year.

♦ ♦ ♦

J. J. Murray, who has served in various export capacities during the last 28 years for Hewitt-Robins Inc., New York, has been appointed to the newly created position of export manager. Mr. Murray supervised export activities of the Hewitt Rubber Division for several years and recently assumed direction of export activities for the Robins Conveyors and Rest-foam Divisions.

♦ ♦ ♦

W. B. Landers has been appointed district sales representative in southeast Texas for Baker Industrial Truck Division, Baker-Raulang Co., Cleveland. Mr. Landers has been associated with the industrial truck industry since 1937 and has had his own business in Atlanta since 1940. **Fred R. Ramsen** has been appointed district sales representative in southern Illinois and eastern Missouri for the company.

♦ ♦ ♦

Walter W. Kemphert has been elected vice president in charge of sales, Skilsaw Inc., Chicago, manufacturers of portable electric tools. Mr. Kemphert, a graduate of Northwestern University, has spent the last 20 years with Worthington Pump & Machinery Corp., Harrison, N. J., where he served in sales promotion, advertising and merchandising activities. He is treasurer of the American Supply and Machinery Manufacturers' Association.

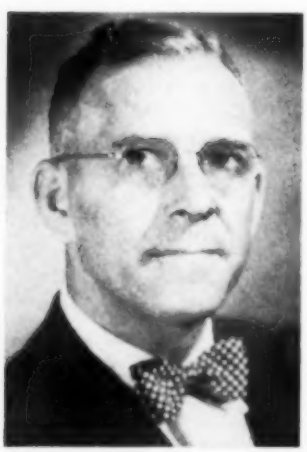
♦ ♦ ♦

John F. White, until recently associated with the New York office, the Dow Chemical Co., Midland, Mich., has been transferred to the Boston office where he will handle the sale of general magnesium products in Massachusetts, Vermont, New Hampshire, Maine and part of Connecticut. Mr. White, who was graduated from University of Illinois, has been with the company since 1943.

♦ ♦ ♦

Ampco Metal Inc., Milwaukee, has announced the following changes within the organization. **S. C. Lawson** has been appointed general sales manager, succeeding **R. J. Thompson,** who has been transferred to California as engineering and sales manager for the company's West coast activities. Mr. Lawson, a graduate of University of Wisconsin, joined Ampco in 1938 as a sales engineer, became central zone manager in 1940 and assistant general sales manager in 1945. **J. P. Henry,** for the past 3 years eastern zone manager, with headquarters at Hartford, Conn., succeeds Mr. Lawson as assistant gen-

(*Concluded on page* 112)



HOBART C. McDANIEL

JOSEPH W. FARLEY

BAY STATE WHEELS can take it!

SNAGGING and cleaning operations are the toughest of grinding jobs. Bay State's wheels are "built" to meet such demands. They are rugged . . . they are efficient . . . they remove unwanted metal fast . . . they are safe.

HIGH OR LOW SPEED SNAGGING WHEELS for floor stand, swing frame and portable machines . . . DISC WHEELS . . . CONES . . . MOUNTED POINTS . . . CUT-OFF WHEELS . . . BAYFLEX RAISED HUB DISCS . . . CORE FILES . . . on all of these products Bay State is anxious to serve you. Send us your problems.

Extra safety precautions
Steel nut tightly secured in resinoid wheels (Bay State patent #2172242)
Steel ring in certain types

Branch offices and warehouses
Cleveland — Chicago — Detroit
Distributors — All principal cities

BAY STATE®

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO., WESTBORO, MASSACHUSETTS, U. S. A.

(*Concluded from page* 110)

eral sales manager. **E. E. Whitson,** formerly Philadelphia district manager, has been appointed advertising manager. **J. E. Cook** has been transferred from Cincinnati to Philadelphia as district manager, **F. A. Burnett,** from Indianapolis to Cincinnati, as district manager, and **W. F. Taff** from sales engineer in Indianapolis district to manager of that territory.

WILLIAM J. MATON

For 44 years foundry superintendent, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., has retired. Reported in THE FOUNDRY, September, p. 114

♦ ♦ ♦

H. L. Smalley has been made assistant to the vice president, Harbison-Walker Refractories Co., Pittsburgh, with supervision over Chicago, Detroit and Indianapolis districts of the company. Mr. Smalley, who joined Harbison-Walker in 1922, was transferred later to the Chicago sales office. He has been sales manager of the Chicago district since 1928.

♦ ♦ ♦

C. R. Fischer has been appointed sales representative in eastern Pennsylvania and New Jersey for George P. Reintjes Co., Kansas City, Mo., manufacturer of suspended walls and arches. Mr. Fischer, whose headquarters will be in Philadelphia, was formerly manufacturers' representative for Fenno-Fischer Co., in the same area.

♦ ♦ ♦

Prof. Dana J. Demorest, who has been associated with the department of metallurgy, Ohio State University, for over 30 years, has resigned as its chairman. Dr. Demorest, who was graduated from the university in 1908, will continue to teach.

♦ ♦ ♦

Sherrill S. Deputy, since 1946 assistant sales manager, American Wheelabrator Co., Mishawaka, Ind., has been appointed sales manager of the company. Prior to his association with American Wheelabrator, Mr. Deputy spent 18 years with International Business Machines Inc., New York, in various sales and administrative positions.

♦ ♦ ♦

Dr. D. P. Morgan, who was recently appointed administrator of research and development, Mathieson Chemical Corp., New York, has been appointed vice president in charge of the development department. A graduate of Harvard University, Dr. Morgan served as director of the Chemicals Bureau, WPB, during the recent war.

♦ ♦ ♦

A. F. Westerfield has been relieved of his duties as head of the Southern branch, United States Radiator Corp., Detroit, until Jan. 31, 1949, to serve in the capacity of special assistant to Wesley J. Peoples, president, on assignments connected with expansion of the corporation's activities.

♦ ♦ ♦

Robert J. Stein, formerly asistant secretary and assistant treasurer, Acme Aluminum Alloys Inc., Dayton, O., has been appointed Michigan sales representative, with headquarters in Detroit.

♦ ♦ ♦

Evan Alge has been appointed general manager of the foundry, Metal Engineering Co., Mitchell, Ind., succeeding **R. D. Decker,** who has become associated with Nonferrous Foundries Inc., Indianapolis.

LEON J. WISE

Named vice president and a director, Chicago Malleable Castings Co., Chicago. Reported in *The Foundry*, August, p. 108

♦ ♦ ♦

Harry C. Taylor has been appointed blast furnace superintendent, Globe Iron Co., Jackson, O. **Benjamin I. Eggers** is general superintendent.

♦ ♦ ♦

Anthony Cristello has been named executive vice president, American Light Alloys Inc., Little Falls, N. J. Mr. Cristello has been associated with the nonferrous foundry industry for the past 20 years and until recently was manager, Eclipse Pioneer Foundries, Bendix Aviation Corp., Teterboro, N. J.

♦ ♦ ♦

R. J. Stockham, vice president, Stockham Pipe Fittings Co., Birmingham, has been elected chairman of the Southern Industrial Relations Conference, succeeding **E. J. Robeson Jr.,** vice president, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

♦ ♦ ♦

Leon F. Corp has been appointed acting manager of the Lockport, N. Y., plant of the Central Foundry Division, General Motors Corp. Mr. Corp succeeds **Donald L. Boyes,** who has been named division sales manager with headquarters at Saginaw, Mich.

♦ ♦ ♦

E. H. Mebs, formerly foundry superintendent, Johnstown-Lorain Works, Carnegie-Illinois Steel Corp., Johnstown, Pa., has been appointed to the newly created position of works manager, the Machined Steel Castings Co., Alliance, O.

♦ ♦ ♦

J. B. Dear has been appointed assistant sales manager, Duraloy Co., Scottdale, Pa. Mr. Dear has been in the factory sales office of the company for many years.

♦ ♦ ♦

John Lavelle has been appointed foundry foreman, United Boiler, Heating & Foundry Co. Inc., Hammond, Ind., succeeding **Oscar Freed,** who has resigned.

♦ ♦ ♦

R. J. Thompson has been named manager of engineering and sales at the Burbank, Calif., plant, Ampco Metal Inc. Mr. Thompson was formerly general sales manager.

Book Review

ASTM Specifications for Steel Piping Materials, paper, 308 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia. Price $3.

Compiled by the American Society for Testing Materials, this volume contains 46 standard and tentative standards relating to steel piping and related materials such as tubes, castings, forgings, and bolts. In addition standard E 19 on austenitic grain size in steel with two charts is included. Five of the standards relate to castings for general application and for high temperature service.

SLY TUMBLING MILLS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

Modern Design Throughout

Anti-Friction Bearings — Direct Motor Drive

Sturdy Construction for

Long Life — Low Maintenance

SLY TUMBLING MILLS

Can be Furnished as Follows:

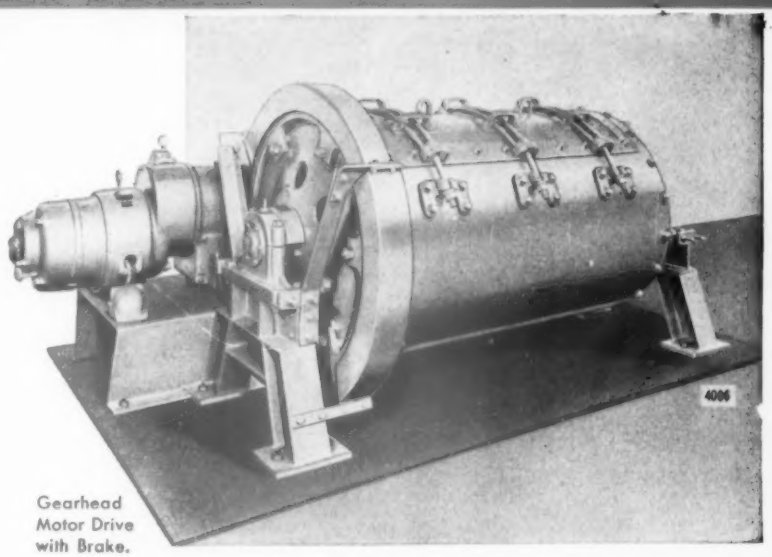
Inside diameters: 24″, 30″, 36″, 42″, and 48″.
Inside length from 36″ up.

Special Designs for

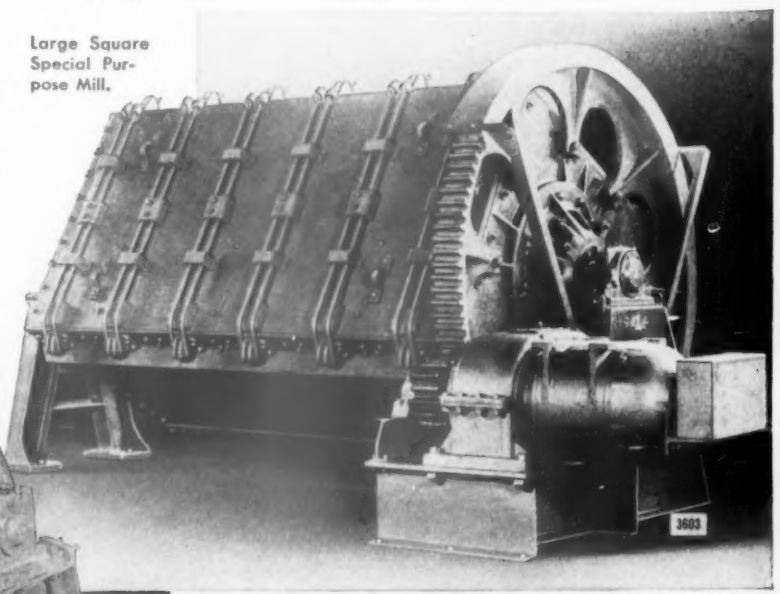
Stove Plate	Sprue Cleaning
Soil Pipe	Welding Rods
Waterpipe Fittings	Cast Anchor Chain

Drives for Mills

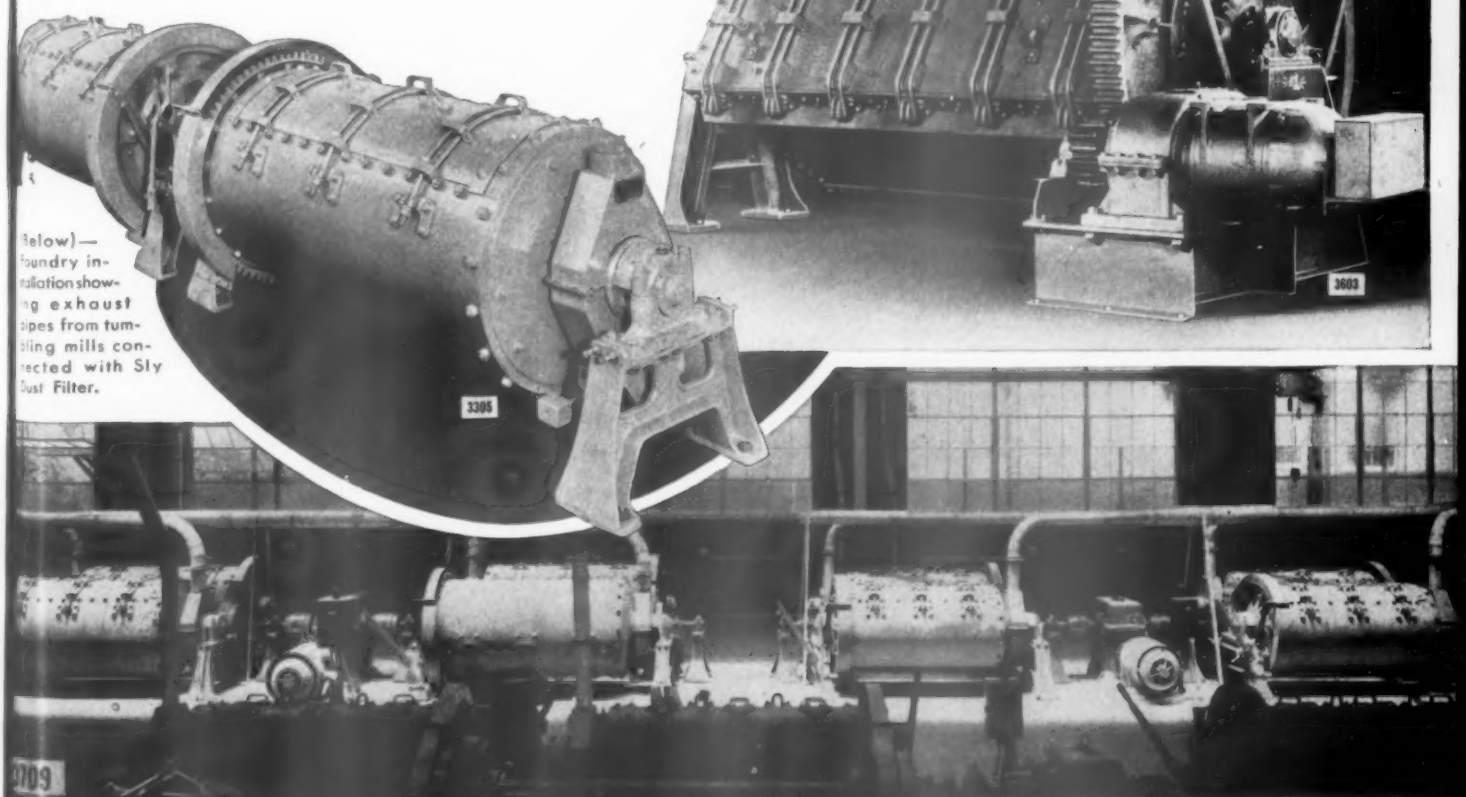
For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.



…elow)— …oundry in- …allation show- …g exhaust …ipes from tum- …ling mills con- …ected with Sly …ust Filter.

THE W. W. SLY MANUFACTURING CO.

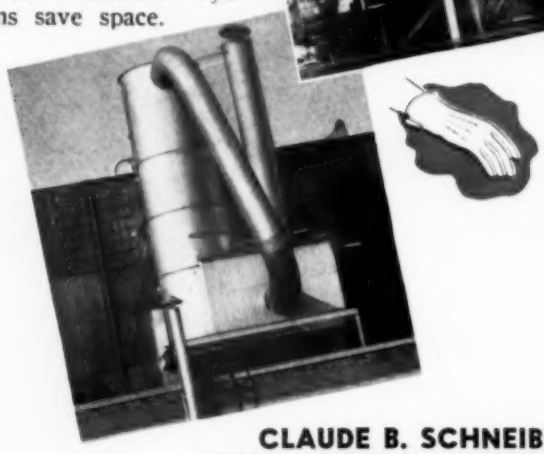
4753 TRAIN AVENUE — CLEVELAND 2, OHIO

A Schneible Multi-Wash System FITS like a glove !

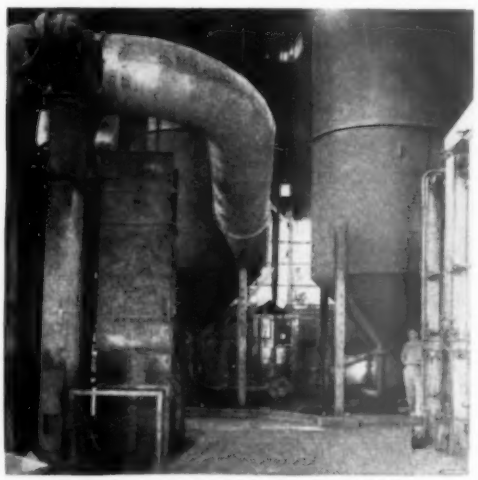
Any foundry, any type of building, no matter what the restrictions—a Schneible Multi-Wash Dust Collector System fits like a glove. Contaminated air enters collector through tangential inlets from any side or several sides. Collected dust as sludge flows by gravity, or can be pumped a long distance, to dewatering tank. Wash water can be used over and over. Schneible installations fit like a glove on these four foundries.

In corner of scrap storage yard of large steel foundry. Dewatering tank and recirculating pump are under sand bins in remote part of plant. Plenty of room for a Schneible in any foundry.

This Schneible Collector was installed overhead in this mechanized foundry without interference or a single shutdown. Schneible Systems save space.



On the roof, out of the way, this Schneible unit gets all of the dust and fumes from this large foundry — molding floor shakeouts, grinding, sand conditioning. Disposal of collected material presents no problem.



Two Schneible 30,000 c. f. m. collectors in corner of sand conditioning and storage bay of steel foundry — accessible yet out of the way. Skilled Schneible sales engineers can plan an installation for you that will *fit like a glove.*

CLAUDE B. SCHNEIBLE CO.
2827 Twenty-Fifth St. • Detroit 16, Michigan
Engineering Representatives in Principal Cities

SCHNEIBLE

LIQUID VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

ADJUSTING IRON COMPOSITION

By Addition of Ferroalloy Briquets

By JOHN N. LUDWIG Jr.
Division Manager of Service
Electro Metallurgical Co.

THE current lack of a variety in grades of pig iron available for the foundryman's use offers no serious handicaps in present-day operations—thanks to modern materials and methods. In times not too long past the type of iron desired for a given casting was obtained by the "mixing method"; that is, by melting proportionate amounts of as many as three or four different analyses of pig iron in a charge to obtain proper type iron (analysis) for a given size of casting. Not so now. Foundrymen today take in and use successfully almost any grade of iron the pig iron shipper has available. Lump and briquetted ferroalloy additions supplementing off-silicon pig iron charges enable him to control better than ever desired properties in the iron such as chill, density, strength, machinability, etc.

Favor Ferroalloy Briquets

In using lump ferroalloy additions in cupola charges, silicon is added as silvery pig (6-15 per cent Si) or 50 per cent ferrosilicon; manganese is added as spiegel, standard (80 per cent) ferromanganese, or silicomanganese (17 per cent Si, 68 per cent Mn) alloy; and chromium is added as high-carbon ferrochrome (68 per cent Cr). Inconvenience in breaking and weighing small amounts of these alloys, with possible poor performance due to small or irregularly sized pieces and early oxidation of alloy, has favored the use of briquetted ferroalloys.

Properly made ferroalloy briquets should have the alloys—ferrosilicon, ferromanganese, silicomanganese, ferrochrome, etc.—crushed to the proper size for best performance, and have a binder of material which would give the briquets high crushing strength and have them melt at a proper rate and place in the cupola. Briquets should be made to contain accurate and uniform amounts of a given alloy per briquet, and the different kinds of briquets should have distinctive shapes or markings to render them foolproof in use.

To illustrate how briquets are used, let us take a typical case. A carload of pig iron received for use has a reported analysis of 2.25 per cent Si and 0.75 per cent Mn. Assume the foundryman desires to make two grades of iron using this pig in his day's run. Part of the melt is to be high-strength iron and the balance regular soft iron.

In his high strength mixture he would like to use 30 per cent steel and 25 per cent pig iron, and aim for a final 2.0 per cent Si content. In his soft iron he desires to use the same amount of pig iron without any steel in his charge and would like his final analysis to finish 2.40 per cent silicon content. Manganese around 0.75 per cent is desired in both of these irons.

The charges he sets up for the high strength mixture are as shown in Table I.

Working out manganese recovery in a similar manner, assuming a 15 per cent melting loss, it is found that this element will run about 0.085 per cent low. At 85 per cent recovery this requires, 1000 × .10% = 1 Lb manganese. Therefore, use one-half manganese or silicomanganese briquet addition per charge.

TABLE I—High Strength Mixture

Weight of Material		Adds to Charge
250 lb pig iron 2.25% Si	25% × 2.25 =	.56% Si
300 lb ret. scrap— 2.00% Si	30% × 2.00 =	.60% Si
300 lb steel— 0.10% Si	30% × .10 =	.03% Si
150 lb pur. scrap— 2.20% Si	15% × 2.20 =	.33% Si
1000 lb base charge containing		1.52% Si

2.00% Si desired requires:

2.00 / 90% recovery = 2.20% total Si required

2.20% total Si required − 1.52% Si in charge = .68% Si to be added

1000 lb charge × .68% = 6.8 lbs Si to be added

Use seven small silicon briquets per charge

TABLE II—Soft Iron

Weight of Material		Adds to Charge
250 lb pig iron— 2.25% Si	25% × 2.25 =	.56% Si
300 lb ret. scrap— 2.40% Si	30% × 2.40 =	.72% Si
No steel used		
450 lb pur. scrap— 2.20% Si	45% × 2.20 =	.99% Si
1000 lb base charge containing		2.27% Si

2.40% Si desired requires:

2.40 / 90% recovery = 2.67% total Si required

2.67% total Si required − 2.27% Si in charge = .40% Si to be added

1000 lb charge × .40% = 4.0 lbs Si to be added

Use four small silicon briquets per charge

For soft iron mixture the silicon addition would be figured as in Table II. Manganese briquet figure in this instance will be about the same as given previously under the high-strength mixture charge.

Let us now assume that this carload of pig iron was entirely used and a new shipment is received which analyzes 2.75 per cent Si. Using the same amount of pig iron in the charges for both grades of iron, 250 lb of this new pig iron adds 1.25 lb more silicon to the 1000-lb charge than the old pig iron. Therefore, silicon is reduced per charge by that amount, taking out the equivalent silicon in briquets. Take off one or one and a half small briquets per charge If subsequent cars of iron come in lower, add silicon with briquets to the amount needed. Correction for any grade of pig iron to be used thus is easily made.

Reduce Silicon Content

Now suppose during the run with this iron the metal seems open or a little on the soft side as noted in chill tests. The cupola control man easily reduces silicon by cutting off one or two small briquets per charge (1000 lb base), and thus drops the silicon in his iron from about 10 to 20 points to correct the trouble as soon as it begins to develop. By this method, control of the iron is easy and rapid. Here again we can point out that if this condition were to be corrected by the "mixing method," adjustment would be difficult. It would mean undoing a large number of charges and reweighing the different amounts of the various grades of pig iron which had been weighed up and were ready for charging. The use of the ferroalloy briquets, therefore, simplifies operations from this angle.

Most iron being furnished today is made to around 2.0 per cent Si content. Higher silicon pig irons, containing 3.00 to 3.50 per cent Si, are almost unavailable. The foundrymen who first felt that this was a handicap now report they favor using a low-silicon iron, for it enables them to run more consistently with more uniform properties in the iron. Low-silicon pig iron usually contains higher total carbon than high-silicon pig iron. To the foundryman this is an unrecognized blessing. In operations today, low total carbon iron troubles develop frequently from poor scrap and questionable quality of coke. The combination of low-silicon pig iron plus briquets, therefore, is usually a better scrap carrier than the high-silicon grade of pig iron, and better results consequently are obtained when using large quantities of the poor quality scrap available today.

All Scrap Charges—Many foundries today do not have the good fortune of receiving adequate shipments of pig iron for their needs. At times they are obliged to run all

scrap charges. Briquetted ferro-alloys in such cases have been most helpful to them. By means of silicon briquets these foundrymen run silicon in their iron to any desired level regardless of type and quality of scrap melted. Usually 90 per cent recovery of silicon added in properly made silicon briquets is obtained, and additions of one, two or three briquets per 1000-lb charge will add 0.10, 0.20 or 0.30 per cent Si (before allowance for the 10 per cent melting loss has been deducted).

In these all scrap charges high sulphur troubles often develop, and manganese additions are helpful in offsetting bad effects from this. Manganese can be added by additions of the lump ferroalloys as mentioned, or as ferromanganese or silicomanganese briquets. Recovery from manganese added as briquets is usually around 85 per cent of the manganese added except, of course, when extremely bad conditions and excessive need for deoxidation prevail. Under such circumstances and when manganese is performing in the manner desired as a deoxidizer and fluxing agent, losses might be higher, in the order of 20-25 per cent of the manganese added.

Ladle Inoculants — It would be neglectful in an article on modern methods in the gray iron foundry to omit mention of the use of ladle inoculants. These are broadly classified as graphitizers and carbide stabilizers.

Ferrosilicon (50, 75, 80, 85 and 95 per cent silicon grade) calcium-silicon, silicon-zirconium, silicon-manganese-zirconium, silicon-titanium-calcium, ferromanganese silicon, and other such combinations of graphitizing alloys are used in amounts sufficient to add up to as much as about 0.50 per cent silicon to closely control chill as required for a given section or type casting. This, of course, controls the hardness and machinability of the iron.

In high strength cast iron—low total carbon irons—ladle additions of silicon-bearing graphitizers (used to replace a portion of the silicon added through the cupola) have marked benefits in improving tensile and transverse strength, brinell hardness, machinability and wear resistance.

In higher carbon irons, to offset the softening effects of silicon, carbide stabilizing alloys are used. These basically are ferrochrome with balanced additions of deoxidizers such as silicon, zirconium, manganese, etc., to cushion the chill promoting and hardening effect of the chromium, and yet get the benefits of increase in strength and density which chromium adds.

PULVERIZED VERMICULITE

Has Foundry Applications

By TONY WILLCOX
Sales Engineer
Minnesota Micaceous Products Inc.
Minneapolis

VERMICULITE, an ore somewhat similar to mica, is now being used in the nonferrous foundry. Pulverized vermiculite is a golden brown powder of extremely light weight, and this powder, refined to a degree permitting ready dispersal in water, has properties desirable for foundry use. The fusion point is above any temperature obtained in the nonferrous field. The powder is chemically inert, and will not absorb water. An extremely thin film of this powder has good insulation properties. These factors have led to the application of the material as a general inhibitor, core wash and refractory facing for permanent molds.

A slurry of pulverized vermiculite and water may be applied as a ladle wash or to melting pots in the nonferrous foundry. Tests indicate that this material can counteract the combined effect of heat and acidity in the handling of molten metals.

Mixed to a thick cream-like consistency with water, pulverized vermiculite can be applied as a core wash to baked sand cores. After pasting the halves of cores together, this same wash may be applied as a sealer. Use of the wash is claimed to result in the greatly desired cleaner shake-out and smoother inside surface from reduced penetration. Due to the fact that this powder does not draw or absorb moisture, these washed cores can be racked and stored indefinitely until ready for preheating and use.

As a refractory facing for permanent mold casting, pulverized vermiculite has been applied with the familiar sodium silicate and water binder. This coating, used as both a sub-coat or under-coat to more familiar facings, or as the actual mold facing, is claimed to provide good insulation protection to thin wall sections and small risers, as well as a tough, wear-resistant surface having a texture smooth enough to meet the rigid requirement of the flatiron sole plate specification.

New Manual Covers Copper-base Alloys

Educational manual, "Copper-base Casting Alloys," published by Federated Metals, division of American Smelting & Refining Co., 120 Broadway, New York 5, deals extensively with the practical application of copper-base metallurgy. It also includes a compilation of standard industry specification tables, among which are those of the ASTM, ASM, SAE, U. S. Navy and federal government.

Covered in the text are thermal effects, shrinkage porosity, gas porosity, and various behavior characteristics of high copper alloys, tin bronzes and red brasses, yellow brasses, manganese bronze, nickel silver, aluminum bronze, silicon bronze and silicon brass.

Urges Deferment of Stockpiling

Stockpiling of scrap or pig iron, in addition to being very costly, would deprive the iron and steel industry of material necessary to maintain current near-peak production, it was asserted recently in a staff study for National Security Resources Board. The study was made by R. J. Wysor, special consultant, who formerly was president, Republic Steel Corp., Cleveland.

Stockpiling, the study concluded, "should be deferred until conditions in the iron and steel industry are propitious due to slackened production." While some early relief may be obtained by importing scrap from Germany and elsewhere, the study pointed out that in the long run stockpiles will return to normal only during the next slack period in the industry.

The study listed many factors which have contributed to the present acute scrap shortage, chief of which were heavy exports if iron and steel scrap metal during the 1930's and tremendous shipments of war material during World War II.

"Our country," the study declared, "should be on its guard never again to engage in a similar heyday of exporting such a vital, quick asset material as scrap, which occurred in the years just prior to World War II. Further, in the desirable export of iron and steel products, emphasis should be placed on finished, rather than on crude or semi-finished products, which carry an additional scrap loss out of the country."

That's where we put our rejects

TRUSCOR (light weight) AMERIKOR (heavy weight) Cereal Binders improve quality of castings and cut down on the number of rejects.

These cereal binders add flowability, texture and green strength. Whether bench made — machine made — or blower made cores, no part is too small or too remote for accuracy.

And because the cereal burns out rapidly and completely during casting, permeability and collapsibility are at once increased to minimize the possibility of blows, cracks, etc.

Specify Krause Cereal Binders on your next order — TRUSCOR, if you like light weight; AMERIKOR, if you prefer the heavy weight.

CHAS. A. KRAUSE MILLING CO., MILWAUKEE 1, WIS.
World's largest millers of dry corn.

Truscor (Light Weight) **AND Amerikor** (Heavy Weight)

CEREAL BINDERS

DISTRIBUTORS

M. A. Bell Co., 3430 Brighton Blvd., Denver, Colo.
M. A. Bell Co., 401 Velasco St. Houston, Texas
M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc. Richmond 21, Va.
Foundry Supplies Co. Chicago 16, Ill.
J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Joseph B. Meier, 96 N. 18th St East Orange, N. J.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co. Seattle 4, Wash.
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works Oakland 8, Calif.
Porter-Warner Chattanooga 2, Tenn.
Smith-Sharpe Co. Minneapolis 14, Minn.
Frederic B. Stevens, Inc. Buffalo 12, N. Y.
Frederic B. Stevens, Inc. Cleveland 14, Ohio
Frederic B. Stevens, Inc. Detroit 26, Mich.
Western Industrial Supply Co. 208 S. E. Hawthorne Blvd. Portland 14, Oregon

HOW TO REINFORCE A

Fragile Pattern

By JOHN R. NICHOLS

METHOD adopted for making a mold from the light and rather fragile pattern shown in the accompanying illustrations may represent common practice in some foundries, but it may also prove of interest to readers whose experience does not include instances of a similar character. With minor variations the basic idea may be applied in whole or in part to many patterns subject to distortion during the molding process.

The casting shown in Fig. 1, a machine stand frame, consists of a top plate with a rectangular opening and angled edges, also four angle section legs. Two stiffener ribs are on the underside of the plate. A small plate at the bottom of each leg serves as a foot for bolting the casting to the floor. On the pattern the ribs and feet are loose. The pattern conforms exactly to the shape of the casting and fits freely but closely over a center block shown in Fig. 2. This block projects at four points between the legs to form core prints. Liberal taper is provided on the prints to facilitate removal of the green sand core, and later replacement. The rectangular top plate forms and leaves its own green sand core.

In the molding process the center block with pattern attached is inverted and bedded in the foundry floor. This method, of course, is optional. Where suitable flasks are available the block and pattern could be placed in a drag, surrounded with rammed sand and rolled over. In either case, the center or reinforcing block is removed after ramming. Its purpose has been served and it is not needed in the further cycle of operation. If necessary, the mold face is touched up with the tools here and there. The sand face between the pattern legs is covered with paper, or with a thin layer of wet parting sand. The loose pieces or feet A are dowelled in place and then the inside, or core, suitably reinforced with small rods, is rammed up to the top of the pattern. Upright hook bolts, which engage some of the cross rods, are arranged as the ramming progresses.

With the loose pieces B in position, a flat parting is made all around the pattern. The cope then is lowered into place, filled with sand and rammed.

The cope is lifted off twice—first for removal of the loose pieces B. With the cope replaced, small rails or large washers are placed on top of the cope and the bolts are screwed up tight. The cope is lifted again and the core comes with it. The loose pieces A are removed. Then the main pattern is lifted out of the mold, and the combined cope and core are lowered back into place.

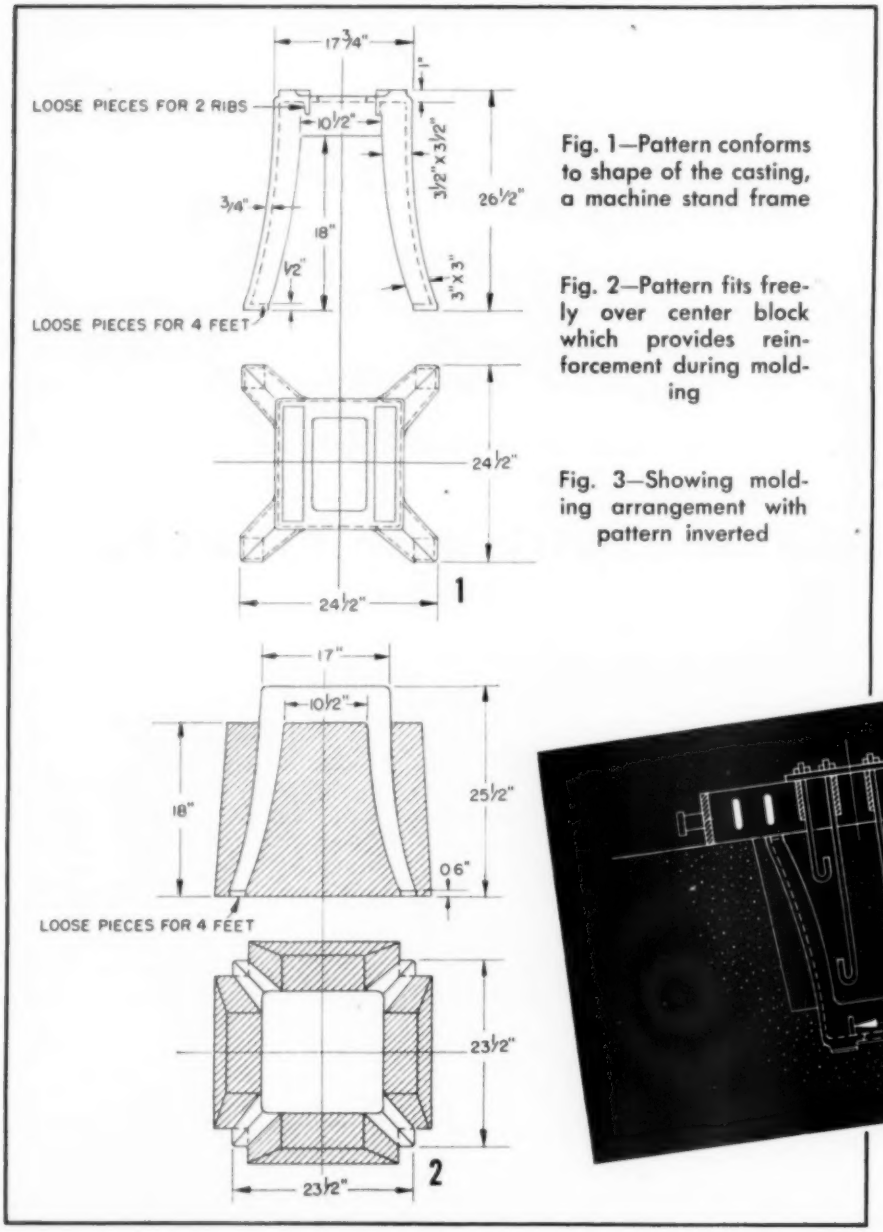
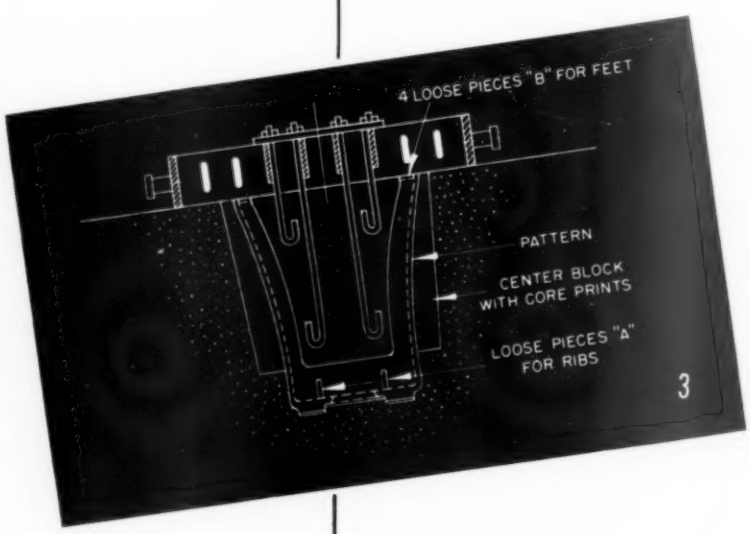


Fig. 1—Pattern conforms to shape of the casting, a machine stand frame

Fig. 2—Pattern fits freely over center block which provides reinforcement during molding

Fig. 3—Showing molding arrangement with pattern inverted



B&W
80 FIREBRICK

last 17 years
in severe service

In 1931, B&W 80 Firebrick were installed in a Round Mill Furnace of one of the large steel companies to solve the problem of refractory shrinkage — which was causing early failure and loss of production.

Today, after 17 years of grueling service—including continuous use under heavy wartime loads and high temperatures—most of the original B&W 80 Firebrick lining is still in service!

If you want to be sure of lower furnace operating costs and increased furnace output, call your local B&W Refractories Engineer. He will be glad to discuss your refractories problems with you.

B-303

B&W REFRACTORIES PRODUCTS

B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
B&W 80 GLASS TANK BLOCKS • B&W INSULATING FIREBRICK
B&W REFRACTORY CASTABLES, PLASTICS AND MORTARS

•

OTHER B&W PRODUCTS

Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers
Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

AROUND Detroit

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Foundry strike cripples operations of some automobile builders during 54-day shutdown. . . . Reduced pig iron consumption offset by closing of merchant blast furnace for relining

ESSENTIAL character of cylinder blocks, heads, camshafts and crankshafts in the building of automobiles and the dangers inherent in being limited to a single source on any one of these items were forcibly demonstrated to a number of car manufacturers in the disastrous strike the past summer at Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., during which about 54 days of production was lost, the equivalent of perhaps 50,000 tons of gray iron. Although the strike finally was ended late in August, it was not possible to return all of the five strikebound C-W-C plants to operation, since only about 1000 of the 3200 employed there in June returned to their jobs early in September. The rest either had taken other jobs in the area or were in no hurry to get back.

Probably the hardest hit among the auto builders was Hudson, although Ford, Chrysler divisions, Oldsmobile, Studebaker and Continental Motors suffered major interruptions to castings supplies and were forced to extreme measures to keep their lines moving. Hudson is believed to have lost the equivalent of 14,000 cars, building only a few more than 500 during the entire month of August. That is production with a wholesale value of something over $22 million, not to mention the lost wages of the company's 20,000 employees. For awhile Hudson was able to keep its 6-cylinder models going because a fairly good bank of cylinder blocks for this engine had been accumulated while tooling was being organized earlier this year. However, when these were exhausted late in July, there was nothing to do but close up shop.

Prior to C-W-C's reopening Hudson had made arrangements with Wilson Foundry & Machine in Pontiac and Lakey Foundry & Machine in Muskegon to cast cylinder blocks, and had located a source in Ohio to forge camshafts. These sources were slow to get started and even a couple of weeks ago, Hudson output was limping at best.

The C-W-C tieup was a bitter affair. Apparently a new contract with the UAW-CIO union at the plants had been all negotiated and was ready to sign, providing wage increases, hospitalization, improved vacation pay and other benefits, when a sparsely attended union mass meeting voted it down and the union head interjected the demand for a union shop and checkoff system. A long, wordy battle ensued, with the company officials refusing to budge an inch and federal conciliators failing several times to work out an adjustment. President of the union local filed a $100,000 libel suit against a C-W-C official and the fur flew thick and fast around Muskegon for week after week. Eventually, federal conciliators got the union and company to agree to approve a settlement to be suggested by the mediators. Terms were virtually what had been contained in the original contract turned down by the union, but this time a mass meeting of workers who had been in an 80-day economic squeeze—that is, those who had not gravitated to other jobs — overwhelmingly approved.

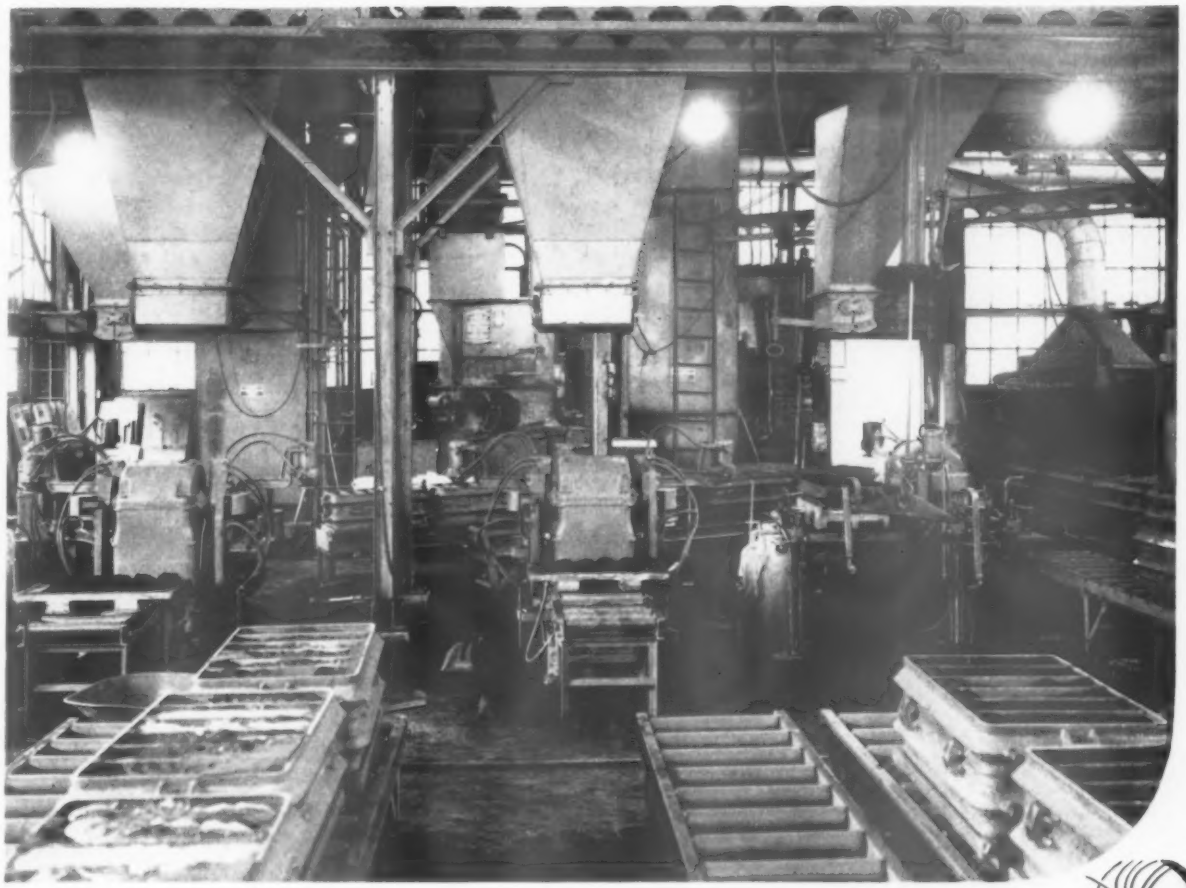
For a considerable time, mass picketing of the C-W-C plants prevented shipping in any materials or shipping out any finished castings and there were a good many thousand castings piled awaiting shipment, principally to Chrysler divisions. When the UAW-CIO in Detroit, at the Chrysler plants, learned that their own jobs were almost certain to be cut off if these castings were not shipped, pressure was put on the Muskegon local to relax the pressure and allow Chrysler trucks into the plant. This was done and the stored camshafts began to move to Detroit. Meanwhile a small supervisory force returned to one plant and was able to start one cupola. About 50 tons of iron was being melted daily and cast into camshafts for several weeks prior to the end of the strike.

Place Line in Production

The Lincoln division of Ford had run out of blocks from C-W-C late in July and was forced to suspend assemblies until an idle casting line at the production foundry in the Rouge plant could be returned to service and patterns brought in from Muskegon. Ford had built up a backlog of about 67,000 of its own blocks during the model changeover this spring and hence did not need the idle line for the present. However, it is capable of supplying only about half of Lincoln requirements and the assumption now is that it will remain in operation for probably a year, with C-W-C being depended on for the balance of Lincoln's block requirements.

The Chrysler divisions really were put to the test in trying to keep camshafts moving to their motor lines. First, a raid was made on Canadian stocks, resulting in better than 10,000 being transferred to U. S. plants. Then schedules were reshuffled on replacement motors, diverting them to current production. One estimate indicates upward of 375,000 replacement motors were slated to be built by Chrysler, Dodge, De Soto and Plymouth plants this year, or roughly 31,000 monthly. Finally, the Dodge forge shop dragged out some old dies and started forging steel camshafts to fill the breech. By some miracle, Chrysler output was fairly well maintained, doubtless

(*Concluded on page* 122)



Got materials-handling problems?

Get the Right Answer the *First* Time

■ In these days of high production costs, most manufacturers can't afford ***not*** to solve their materials-handling problems right the ***first*** time. Trial and error methods are costly in time and money.

Whatever the equipment might be — gravity or power conveyers, or special conveying machinery — it should be designed specifically to meet ***your*** requirements.

It is real economy to get sound engineering help with your materials-handling problems — help from people whose business is the development of efficient handling methods, and the manufacture of fine conveying machinery.

The Mathews organization makes such service available to American and Canadian industries — service which is complete from preliminary planning to erection in the field, and which is backed up by the facilities of three very modern plants.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA

MATHEWS CONVEYER COMPANY WEST COAST
SAN CARLOS, CALIFORNIA

MATHEWS CONVEYER COMPANY, LTD.
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

(*Concluded from page 120*)

being aided considerably by the 50 tons of iron daily which C-W-C was able to melt on an emergency basis.

Continental Motors, builder of Kaiser-Frazer engines as well as a considerable number for its own sale, was able to conclude arrangements with an Illinois foundry to initiate production of 1500 camshafts daily in August, all of them flame hardened manually. The C-W-C camshaft operation, it may be recalled, is a completely mechanized one and there is probably nothing that can touch it in the way of cost. Hardening, quenching and straightening are all carried out in specially designed equipment which no other foundry or machine shop has available. Ford, for example, started to make some camshafts for Lincoln and attempted to obtain the necessary hardness by the used of chills. Reportedly the move was not successful.

Manufacturing programs on the first Kettering-type engines by Cadillac and Oldsmobile were likewise set back by the Muskegon strike, in view of the fact a special type of camshaft is necessary for these engines and C-W-C had engineered the part and was all ready for production. Olds originally planned to show its pilot engine line to the press about mid-August and was forced to delay the event until Sept. 15.

Central Foundry Division of General Motors at Defiance, O., has been delayed on its plans to start melting iron and hence the first blocks for the Olds V-8 will be furnished by Chevrolet Gray Iron at Saginaw. CFD has a schedule of some 10,000 6-cylinder Olds blocks ahead of it, and eventually will move into the V-8 castings, it is understood, once equipment installations are completed. Conveyor lines and cleaning room facilities were not ready to meet the planned melting schedule of late August.

Packard is reported to have placed some cylinder block business with Lakey in Muskegon, apparently being unable to meet planned schedules with production from its own foundry.

It might logically be deduced that the long shutdown at C-W-C, with the attendant loss of 50,000 tons of iron, would have eased the pig iron situation in the Michigan area to the point where other melters would be receiving ample tonnage. Such was not the case, however, one reason being the unexpected closing of a Pickands-Mather merchant furnace in Toledo, O., for relining. This stack was down several months, resulting in a production loss which almost matched what C-W-C did not use in the period. Hence the net gain for other foundry iron users was almost nil.

The furore kicked up over the acquisition of WAA blast furnace at Cleveland by Kaiser-Frazer was of direct interest to a score of Michigan foundries which had been supplied merchant iron by Republic Steel, operator of the furnace. Upshot is that these foundries will continue to receive Republic iron, but Kaiser-Frazer grabbed onto a deal by which it will receive the lesser of 5000 tons of basic iron monthly or one-half the furnace output in excess of 28,000 tons a month. Or it can buy foundry iron up to 1000 tons monthly, deducting this purchase from the 5000 tons of basic iron in the ratio of 1.15:1.

Automotive Die Casting Die Is 80 Inches Long

DESCRIBED as the longest die casting die ever made, the unit pictured here recently was placed in production at the Detroit Division of the Gerity-Michigan Corp. It is used to die cast a zinc alloy automobile fender moulding 65 19/64 in. in length and weighing about 2¾ lb. The die's weight of about 10,000 lb is not a record, the unusual feature of the die being its 80-inch length. It was made of special alloy steel to withstand pressure and heat, and is intended to last through ½ to 1½ million casting operations or production of 1 to 3 million pieces.

Cost Dictionary Is Published

A cost dictionary, designed to assist foundry clerical personnel in classifying all items of foundry expense was recently published by Gray Iron Founders' Society, Public Square Bldg., Cleveland.

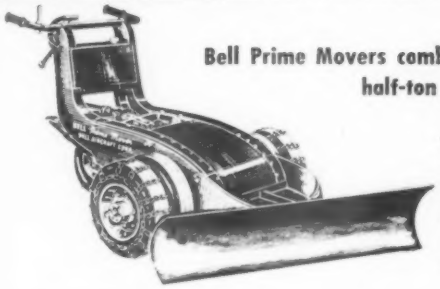
More than 200 items of foundry cost are listed alphabetically, followed by the department and title of the account to which the item should be charged. Opposite each item of cost is a blank space for use by individual foundries in entering their own ledger account numbers. To explain alternate methods of handling certain items of cost, a group of supplementary notes are included.

The manual was developed by J. L. Carter, the society's cost consultant, under the direction of the GIFS cost committee. Copies are available at $1 each.

It saves up to $36 daily

The BELL Prime Mover*

★ PATENTS AND T. M. REG. PENDING. COPYRIGHT, 1948



Bell Prime Movers combine the functions of giant wheelbarrows, half-ton platform trucks, and baby bulldozers . . . enable one man to do the work of four.

Here are just a few examples of how Bell Prime Movers pay for themselves in an amazingly short time. If other companies can make these savings, so can *your* company...

A Pennsylvania foundry reports saving 3 to 4 man-days per machine each day using Prime Movers to distribute core and facing sand; to handle residue from cleaning of cupola; for pouring concrete foundry floor. This is at least $36 daily in direct labor savings.

A New York State stainless-steel foundry reports using its Prime Mover for distributing approximately 20 tons of sand each day. One elderly man now does the job. This Prime Mover was purchased in November. By the end of January it had paid for itself in direct labor savings on this job alone.

Hundreds of other users report equally remarkable daily savings for each machine. If you would like some of these facts . . . as well as other important data about the Prime Mover . . . please write to us. We also can give you the names of nearby distributors who sell and service this machine.

A Few Features

- bucket holds 10 cubic feet . . . 18 with sideboards
- 50-inch scraper blade
- 9-square-foot platform body
- gear driven . . . no belts or chains
- clutch, engine, transmission fully enclosed . . . run in oil

A PRODUCT OF

BELL *Aircraft* CORPORATION

MAIL COUPON TODAY

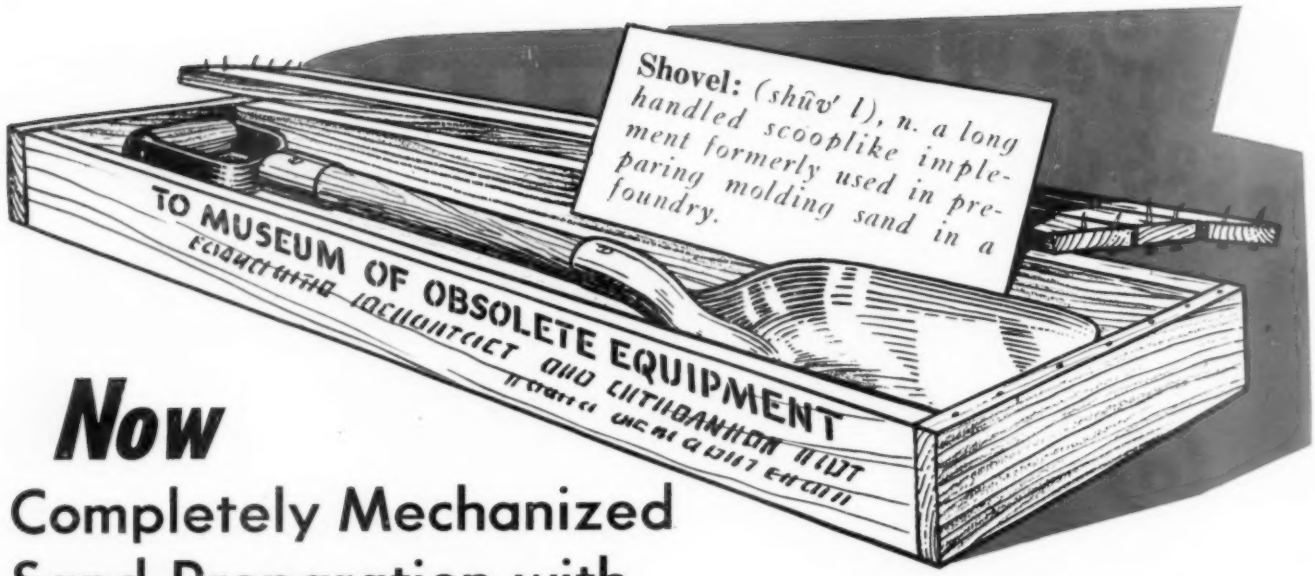
BELL AIRCRAFT CORPORATION,
Post Office 1D-10, Buffalo 5, New York

Please send me additional facts about the Bell Prime Mover.

Name..... *Address*.....

Company.....

City, Zone, and State.....


Shovel: (shŭv' l), n. a long handled scooplike implement formerly used in preparing molding sand in a foundry.
TO MUSEUM OF OBSOLETE EQUIPMENT

Now

Completely Mechanized Sand Preparation with the New Royer Self-Loading Sand Conditioner

Sand shoveling is an obsolete operation in foundries where the new Self-Loading, Self-Propelled Royer Sand Conditioner has been installed. The machine does all the work—under the finger tip control of the operator . . . moving into the sand heap, scooping up sand, automatically removing burnt cores and other trash, combing-blending-aerating and discharging up to 50 tons an hour of perfectly prepared molding sand. Write today for detailed information on this new method of sand preparation.

Let us send you full details about this revolutionary new Self-Loading Sand Conditioner. Write for detailed information.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

STANDARD GRADES OF PIG IRON

American Iron and Steel Institute

The ever-growing variety of chemical compositions and quality requirements of pig iron specifications has been a matter of concern in the iron and steel industry for years. That condition prompted the General Technical Committee of the American Iron and Steel Institute to make a study of it with a view of simplifying the problems of both consumer and producer. Having in mind the potential benefits of simplification and standardization, their survey was first directed to determining which of the many grades being specified were the ones in most common demand; and also to combining specifications having like requirements.

That survey showed that several hundred different combinations of chemical elements were being manufactured to meet the individual demands of purchasers.

The facts thus developed have convinced pig iron producers that if their efforts could be concentrated upon a limited number of standardized grades, deliveries could be expedited and service improved. Moreover, there would be better opportunity to achieve advances in manufacturing practices and quality and to study more fully the possibilities of application inherent in those grades.

The General Technical Committee selected the grades of pig iron listed herein as representing compositions of proven merit and in extensive use for a wide variety of purposes. Such irons are called Standard Grades of Pig Iron.

When the many other grades of iron now being used are critically compared with the equivalent standard grades listed herein it is believed that in most cases the standard grades can successfully be used to replace them without detriment to manufacturing methods or impairment of quality of the article manufactured.

The ranges and limits for the respective chemical elements shown in the tables of standard irons are the fundamental limits to which those irons are being produced. Wider ranges are often desirable for a specific purpose and irons having such ranges are regarded as equivalent to the standard iron the composition of which is completely embraced within the wider specified range.

It is the intention of the General Technical Committee to review the list of standard pig iron compositions at frequent intervals, with a view to keeping it abreast of current practices and needs.

CLASSIFICATIONS AND DEFINITIONS

Pig iron is the term applied to iron produced by the reduction of iron ores in the blast furnace. The term "pig iron" was derived from the peculiar arrangement of the molds in the early method of casting in a sand bed. The resultant shapes, suitable for handling, into which the metal was cast were called pigs. The product of that casting method, now almost obsolete, was known as sand cast pig iron. The common method used now is that of casting the iron into metal molds or chills, thus eliminating the sand that always adhered to sand cast pigs. The product of that method is known as chill cast or machine cast pig iron.

When iron from the blast furnace is held in a molten condition for charging into steelmaking furnaces or for pouring directly in certain foundry practice, it is commonly referred to as hot metal.

A varied and rather complex nomenclature, now obsolete, was applied to the old fracture test method of grading sand cast pig iron. It included the appearance of the fracture, numerical designation of grades, and geographical districts in which the different grades were produced.

That method of grading did not closely relate chemical composition to the use to which pig iron was to be put, and gave rise to continual controversies due to personal error in classifying one or more samples. As time went on, that method of grading was supplanted by a more logical, yet complex method of differentiating grades of pig iron by method of manufacture, by purpose for which it was intended, and by generic chemical composition.

Method of manufacture differentiated among pig irons as (1) coke iron smelted with coke and always with hot blast; (2) anthracite iron smelted with anthracite coal mixed with coke and with hot blast; and (3) charcoal iron smelted with charcoal with either hot or cold blast.

Intended use differentiated among pig irons as basic iron for making basic open hearth steel; bessemer iron for making bessemer steel; foundry iron for general casting purposes; and malleable iron for making malleable castings.

Chemical composition differentiated among the several irons by using a chemical characteristic of the iron as a title, such as low phosphorus iron or high silicon iron.

Even those methods of grading permitted uncertainties, and a standard method of classifying, grading and selling pig iron according to its content of significant chemical elements, silicon, sulphur, phosphorus and manganese, was found to be a necessity. The use to which the iron is to be put determines the amount of each element.

STANDARD GRADES

The grades of pig iron listed as standard herein are those produced and stocked to the full and unrestricted ranges of the chemistry specified for standard irons.

It is recognized that compositions other than those listed in the tables of irons may be produced and will at times be required for specialized uses. Irons so specified are termed Nonstandard Irons.

The compositions listed in the several tables are identified by a series of letters and numbers descriptive of chemical analysis and indicative of intended use.

STANDARD GRADES OF PIG IRON

American Iron and Steel Institute

To be classified as a standard grade of pig iron requires that the chemical composition specified complies without restrictions to the limits shown herein. Ranges shown for the standard grades of pig iron are the narrowest ranges to which those irons can be produced without special manufacturing and stocking practices.

Differences in phosphorus and manganese contents constitute the main distinctions between the classes intended for different purposes. The silicon limits or range also vary within the different classes and are the controlling consideration in grading the product within a class.

The carbon content of pig iron is not controllable within close limits, and it is therefore not customary to specify carbon limits.

SYSTEM OF IDENTIFICATION

For convenient reference, standard grades of pig iron listed herein are designated by the use of prefix letters, suffix letters and numerals.

PREFIX LETTER DESIGNATIONS. For convenience of reference herein, a prefix letter is used which designates grades in order of increasing phosphorus content as follows:

Designation		Phosphorus Content
LP	Low Phosphorus	0.035 per cent, maximum
LPi	Intermediate low phosphorus	0.036 to 0.075 per cent
Bes	Bessemer	0.076 to 0.100 per cent
M	Malleable	0.101 to 0.300 per cent
B	Basic-northern	0.400 per cent, maximum
Fl	Foundry—Northern, low phosphorus	0.300 to 0.500 per cent
Fh	Foundry—Northern, high phosphorus	0.501 to 0.700 per cent
Fs	Foundry—Southern	0.700 to 0.900 per cent
Bs	Basic—southern	0.700 to 0.900 per cent
Cl	Charcoal Iron, Southern	0.035 per cent, maximum
S	Silvery	0.300 per cent, maximum

NUMERALS. Silicon and manganese contents are designated by a six-number system in which the first three numerals designate the average silicon content; the average manganese content is similarly indicated by the last three numerals.

Example

LP 113088

LP denotes phosphorus content of 0.035 per cent maximum

113 denotes silicon content of 1.00 to 1.25 per cent

088 denotes manganese content of 0.76 to 1.00 per cent

SUFFIX LETTER DESIGNATIONS. Modifications of chemical composition are indicated after the numerals as follows:

m indicates a modified manganese range

s indicates a modified silicon range

GRADES DEFINITIONS AND LISTS OF STANDARD GRADES

LP Phosphorus 0.035 Per Cent Maximum

This class of pig iron, generally termed special low phosphorus pig iron is used in making acid open hearth and other kinds of steel required to have an especially low phosphorus content. In manufacturing this grade of iron, ore, coke and limestone must be especially selected for low phosphorus content. It is used for special purposes in gray iron foundries, such as in roll manufacture.

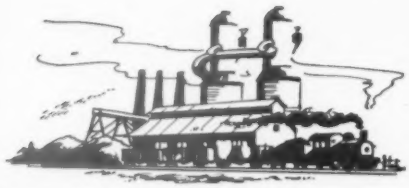
Grade Designation	Composition, per cent Si	S Max.	P Max.	Mn
LP 063075m	0.50/0.75	0.035	0.035	0.75 max.
LP 088075m	0.76/1.00	0.035	0.035	0.75 max.
LP 113075m	1.01/1.25	0.035	0.035	0.75 max.
LP 138075m	1.26/1.50	0.035	0.035	0.75 max.
LP 163075m	1.51/1.75	0.035	0.035	0.75 max.
LP 188075m	1.76/2.00	0.035	0.035	0.75 max.
LP 213075m	2.01/2.25	0.035	0.035	0.75 max.
LP 238075m	2.26/2.50	0.035	0.035	0.75 max.
LP 263075m	2.51/2.75	0.035	0.035	0.75 max.
LP 288075m	2.76/3.00	0.035	0.035	0.75 max.
LP 113088	1.00/1.25	0.035	0.035	0.76/1.00
LP 138088	1.26/1.50	0.035	0.035	0.76/1.00
LP 163088	1.51/1.75	0.035	0.035	0.76/1.00
LP 188088	1.76/2.00	0.035	0.035	0.76/1.00
LP 213088	2.01/2.25	0.035	0.035	0.76/1.00
LP 238088	2.26/2.50	0.035	0.035	0.76/1.00
LP 263088	2.51/2.75	0.035	0.035	0.76/1.00
LP 288088	2.76/3.00	0.035	0.035	0.76/1.00
LP 113113	1.00/1.25	0.035	0.035	1.01/1.25
LP 138113	1.26/1.50	0.035	0.035	1.01/1.25
LP 163113	1.51/1.75	0.035	0.035	1.01/1.25
LP 188113	1.76/2.00	0.035	0.035	1.01/1.25
LP 213113	2.01/2.25	0.035	0.035	1.01/1.25
LP 238113	2.26/2.50	0.035	0.035	1.01/1.25
LP 263113	2.51/2.75	0.035	0.035	1.01/1.25
LP 288113	2.76/3.00	0.035	0.035	1.01/1.25

LPi Phosphorus 0.036 to 0.075 Per Cent

This class of pig iron is used when extremely low phosphorus is not necessary, but when a phosphorus content lower than that if the Bes grade is desired.

Grade Designation	Composition, per cent Si	S max.	P	Mn
LPi 113075m	1.00/1.25	0.05	0.036/0.075	0.75 max.
LPi 138075m	1.26/1.50	0.05	0.036/0.075	0.75 max.
LPi 163075m	1.51/1.75	0.05	0.036/0.075	0.75 max.
LPi 188075m	1.76/2.00	0.05	0.036/0.075	0.75 max.
LPi 213075m	2.01/2.25	0.05	0.036/0.075	0.75 max.
LPi 238075m	2.26/2.50	0.05	0.036/0.075	0.75 max.
LPi 263075m	2.51/2.75	0.05	0.036/0.075	0.75 max.
LPi 288075m	2.76/3.00	0.05	0.036/0.075	0.75 max.
LPi 113088	1.00/1.25	0.05	0.036/0.075	0.76/1.00
LPi 138088	1.26/1.50	0.05	0.036/0.075	0.76/1.00
LPi 163088	1.51/1.75	0.05	0.036/0.075	0.76/1.00
LPi 188088	1.76/2.00	0.05	0.036/0.075	0.76/1.00
LPi 213088	2.01/2.25	0.05	0.036/0.075	0.76/1.00
LPi 238088	2.26/2.50	0.05	0.036/0.075	0.76/1.00
LPi 263088	2.51/2.75	0.05	0.036/0.075	0.76/1.00
LPi 288088	2.76/3.00	0.05	0.036/0.075	0.76/1.00
LPi 113113	1.00/1.25	0.05	0.036/0.075	1.01/1.25
LPi 138113	1.26/1.50	0.05	0.036/0.075	1.01/1.25
LPi 163113	1.51-1.75	0.05	0.036/0.075	1.01/1.25
LPi 188113	1.76/2.00	0.05	0.036/0.075	1.01/1.25
LPi 213113	2.01/2.25	0.05	0.036/0.075	1.01/1.25
LPi 238113	2.26/2.50	0.05	0.036/0.075	1.01/1.25
LPi 263113	2.51/2.75	0.05	0.036/0.075	1.01/1.25
LPi 288113	2.76/3.00	0.05	0.036/0.075	1.01/1.25

(To be continued)



Quality Control in the foundry a job for PYROLANCE!

Quick, accurate temperature readings of molten metal are reason enough why so many non-ferrous foundry operators depend on the Alnor Pyrolance! The protected thermocouple, with adjustable angle head, is mounted in the lance tip—takes temperatures below the surface, unaffected by dross or other conditions. And the rugged pyrometer movement gives accurate readings—quickly, of course. A well-balanced, easily handled instrument you'll like from the first time you try it.

Alnor PRECISION INSTRUMENTS FOR EVERY INDUSTRY

ILLINOIS TESTING LABORATORIES, INC., Chicago 10, Illinois

GET THE WHOLE STORY!

Get a copy of this informative Pyrolance bulletin. Includes photos, complete descriptions and prices. Use this coupon.

Illinois Testing Laboratories, Inc.
Rm. 511, 420 N. LaSalle Street, Chicago 10, Illinois
( ) Send me a copy of Bulletin 1724-D

Name .....

Company Name .....

Address .....

City ..... State .....

FOUNDRY Developments

By EDWIN BREMER

FOR continuous molding operations where there is a sand turnover as often as once an hour, Allis-Chalmers foundrymen have devised a sand cooling arrangement which involves several elements contributing to its effectiveness. First as indicated in the accompanying sketch, the hot sand, conveyed by belt from the shakeout, activates a magnetic valve and target above the belt, turning a fine water spray on the hot sand. Sand then is screened and passed to the storage bin. When mulled the sand is elevated to distributing belt for the molders, in which process it passes through an enclosed screen. A large volume of low-velocity air passes through this sand as it falls to distributing belt, effectively cooling the sand by removing the steam from it. A drop of 60 to 80 degrees is achieved between the muller and the distributing belt through use of the screen.

LOW temperature bronze-base alloy for permanent repairs is claimed to meet a need in many industrial repair and maintenance applications. It is said to handle like putty at only 300°F and fuses with the metal under repair. Finished repair can be machined, filed, drilled and tapped, and will not cause crystallization or distortion. It is claimed to work with any metal except aluminum and its alloys. Ordinary gasoline torch and putty knife form equipment to make repairs.

• • •

SHORTAGE of copper and tin in Germany during the late war resulted in practical abandonment of ordinary copper-base sand casting except for such articles which could not be produced in lead-bronze or by centrifugal methods, according to report PB-34011, "German Nonferrous Foundry Industry" available from the Office of Technical Services, Department of Commerce, Washington 25. Those shortages also led to the practice of bronze facing or coating steel gears which were claimed to have greater strength, longer life and were generally superior to solid cast gears especially for military equipment where great shock was exerted. Method was to use a type of permanent mold made of gray iron coated with clay. An annulus was left between gear and lining for reception of molten bronze. After cooling bronze coated gear was removed and packed in a graphite-sand mixture. This was followed by diffusion heat treatment and final machining.

• • •

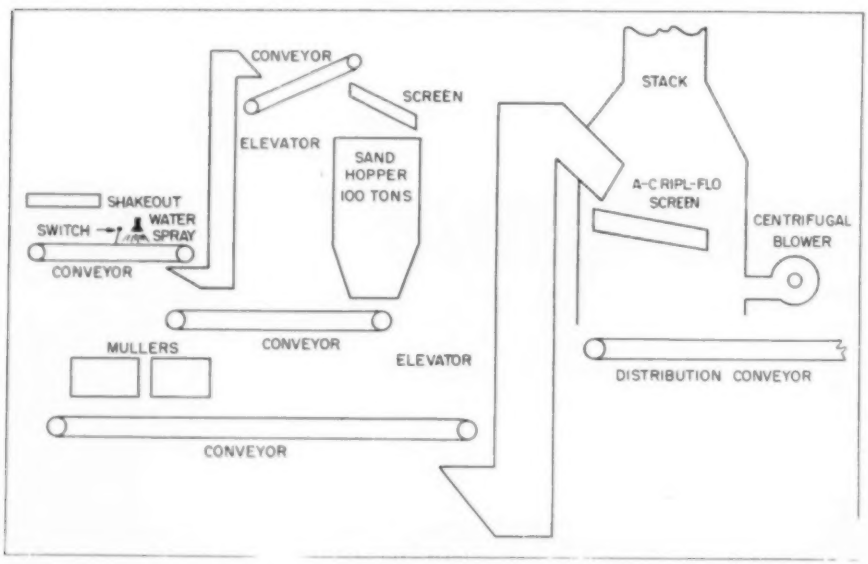
POTENCY of tin as a powerful carbide stabilizer in otherwise normal malleable iron is illustrated by the experience of a Canadian producer which found certain heats responding poorly to the regular annealing treatment. Careful investigation including spectrographic analysis indicated the presence of tin, and chemical analysis showed 0.09 per cent present. While only 0.04 per cent Cr was present, that with the tin gave the same effect as 0.13 per cent Cr. Further search indicated presence of lead and antimony leading to the opinion that the tin addition was the result of babbitt or similar white metal bearing in the scrap which formed part of the charge.

• • •

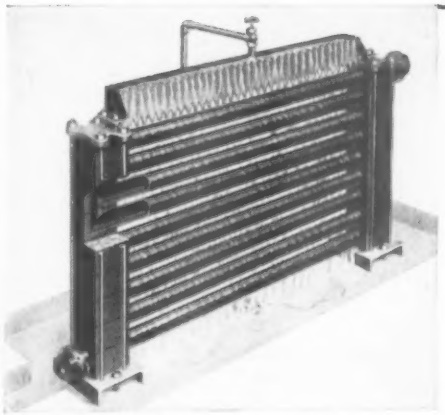
USE OF compressed air jets beneath double burners in oil-fired open-hearth furnaces led to an increase of 15 per cent in production rate according to V. F. Corsini, American Steel & Wire Co., Worcester, Mass., in a paper presented at the National Open Hearth Conference at Pittsburgh. A 4 per cent reduction in fuel also was obtained. The improved production rates and fuel efficiency have reduced net wear of furnace brick through burning of the fuel almost entirely on the hearth of the furnace. Increase in furnace pressure resulting from increased fuel input also materially aided production rates and reduced fuel consumption.

• • •

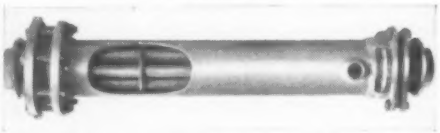
NICKEL plating without use of electric current is claimed for a new material on the market. Said to leave a bright finish that is tarnish and corrosion proof, it may be applied to any base metal with excellent bond without excess metal build-up or beading on sharp corners. Through use of heat treatment at relatively low temperature, harmless to the finish and most base metals, it may be hardened to a level almost that of hard chromium plate.



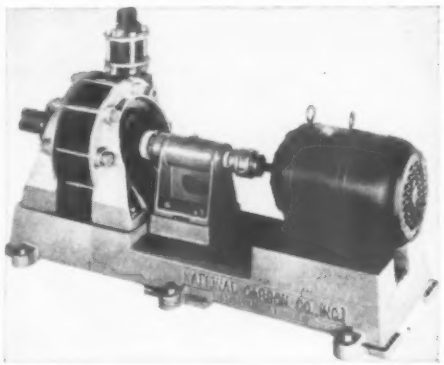
Diagrammatic sketch of sand handling equipment



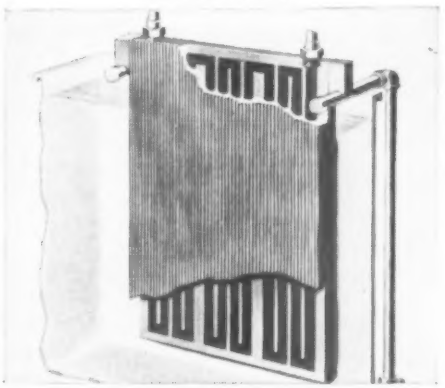
"Karbate" Sectional Cascade Cooler



"Karbate" Series 70 Heat Exchanger



"Karbate" Pump



"Karbate" Plate Heater

Carbon Brick for Tank Lining

How to lick corrosion if you pickle or plate metal . . .

USE NATIONAL CARBON PRODUCTS

FOR HEATING, cooling, pumping, and conveying the corrosive solutions used in pickling and plating metal, there's no better equipment than that made of "Karbate" brand Impervious Graphite. This material is chemically inert, immune to thermal shock, easy to machine and install, light in weight yet strong; and has a very high heat-transfer rate.

Operating experience has proved that "Karbate" equipment stands up in sulphuric, hydrochloric, and nitric-hydrofluoric pickling solutions . . . Parkerizing and Bonderizing baths . . . nickel, copper, tin, and zinc plating solutions . . . electro-polishing and Alumilite and Alzak processes.

"National" carbon brick is now extensively used for lining tanks that handle corrosive solutions — particularly nitric-hydrofluoric.

For more details on metal-cleaning systems of standard "Karbate" brand Impervious Graphite units and "National" carbon brick, write to National Carbon Company, Inc., Dept. FO.

These products sold in Canada by Canadian National Carbon Company Limited, Toronto 4

The registered trade-marks "Karbate" and "National" distinguish products of

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd St., New York 17, N. Y.

Division Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

PRECISION MOLDING PROCESS

Employs Resin Binder

By WILLIAM W. McCULLOUGH
U. S. Department of Commerce
Washington

OBJECT of this investigation was to obtain information relating to the materials and technique of precision molding as developed by Croning & Co., Hamburg, Germany. The method of making molds and cores is a recent German development and may be an important advancement in the art of metal founding. The new method of molding is called the "C" process by the inventor, Johannes Croning. The information given here was obtained through interrogation of Mr. Croning.

The molding material is a dry mixture of high-grade silica sand and a plastic binder in powdered form. The proportion is: Silica sand 92-94 per cent; plastic binder 6-8 per cent. The sand is free of clay and metal oxides, moisture and organic matter. The grains are round and uniformly fine. A sieve analysis of the sand was not available, but the investigator estimated that the AFS grain fineness number would be approximately 90 to 100.

Binder Finely Ground

The plastic binder is composed of phenol resin and hexamethylenetetramine in this proportion: Phenolic resin 90 per cent; hexamethylenetetramine 10 per cent. The binder is prepared by grinding the two materials simultaneously in a ball mill until the resulting powder will pass through a sieve having 102 meshes per in. It is then added to the dry sand and mixed in the usual manner. No water is added.

The procedure for making molds from this material is simple, but metal patterns must always be used because they are subjected to elevated temperatures. The half-pattern, gate, and runner are fixed permanently on a metal plate. Cast iron is the material recommended. A set of beveled bosses and corresponding cavities are machined at convenient spots on the pattern plates and these shapes, when transferred to the mold halves, serve as positioners to insure the exact registration or matching of the two halves.

The pattern unit is heated to 180 to 200°C (360 to 400°F) and sprayed with a paraffin solution. At this temperature the paraffin remains liquid and provides a uniform, oily film. The plate is next clamped, pattern downward, over a box containing the molding material and then the assembly is quickly inverted. This action causes the molding material to fall and cover the surface of the hot pattern and plate. The plastic component, on coming in contact with the hot metal, softens, adjusts itself to the shape of the pattern and plate, and forms a continuous coating over the entire surface. As the loose mass heats up, the coating builds up, and after about six seconds it has a thickness of 3 to 4 mm. (0.012 to 0.016-in.). When the box is again turned over, the excess molding material falls away from the soft coating, and may be used for the next mold.

The pattern plate, with the adhering coating still intact, is placed in an oven at 300°C (570°F) for two or three minutes. The hexamethylenetetramine liberates ammonia and formaldehyde. The ammonia acts as a basic catalyst for the reaction between the formaldehyde and the unreacted phenol in the resin, resulting in the conversion of the resinous material to a hard insoluble Bakelite type plastic which bonds the sand grains together. Upon coming from the oven, the half mold is easily stripped from the pattern plate by means of lifting pins, as the thin film of paraffin acts as a lubricant.

The half mold is, in effect, a thin shell which has enough strength and stiffness to make it suitable for the casting operation. It has the appearance of a molded Bakelite product except that the color is yellow.

Cores are made in much the same manner, except that the molding material is blown into the hot core box by compressed air. The excess material falls out of the box when the flow of air is stopped. The cores are therefore hollow and have the same wall thickness as the molds.

A mold is formed by pasting two half molds together. If cores are required, they are assembled in the mold in the usual manner.

Surrounded by Backing Material

To prepare the mold for casting, it is held in a box with the gate vertical while the surrounding space is filled in with steel shot or some other suitable bedding material. Such a bed helps the thin mold shell resist the hydrostatic pressure of the influent liquid metal. It is claimed that the rate of solidification of the liquid metal can be controlled by varying the type of bedding material used. However, no claim was made for controlled directional solidification.

The liquid metal is poured into the mold cavity in the usual way. The hot metal, on coming in contact with the mold, burns the plastic binder to carbon. Gases generated pass through the mold shell readily, since the mold has extraordinarily high permeability. Mold and core offer very little resistance to the casting as it solidifies and contracts, and the danger of the formation of cracks or hot tears is minimized.

The casting is removed easily from the mold as no burning-on or sticking of sand to the casting surface occurs. Cores can be removed by lightly tapping the casting. Bedding material is returned to a bin and used again.

Castings in iron, steel, and aluminum of a 1.5-in. valve body were inspected by the investigator. Some of the castings had not been previously cleaned, and were still in the as-cast condition with gates and runners attached. These castings had unusually smooth and clean surfaces, and the fin around the part-

(*Concluded on page* 132)

FEF Lists University Entrance Requirements

Several promising young men have experienced difficulty in gaining entrance to engineering colleges which are participating in the Foundry Educational Foundation program, because of lack of preparation while in high school.

University entrance requirements vary from school to school, and ordinarily these qualifications can be satisfied only through the student's taking what amounts to the most difficult of high school programs.

It is recommended by the FEF that the high school student interested in foundry engineering training inquire of the college he expects to enter as to its specific requirements and adjust his high school program to meet them. As a guidance the following is a rather stiff example of the courses required of the high school graduate entering an engineering college: English 3 years; algebra, and history or foreign language each 2 years; plane geometry, physics, chemistry and trigonometry each 1 year; solid geometry ½-year. The foregoing is only a guide, however, and specific requirements are more satisfactory to follow.

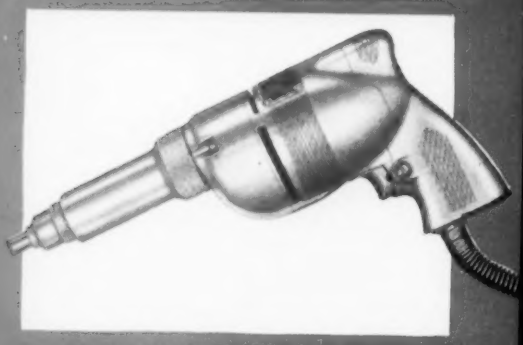
Save seconds at every turn...

Put SKIL Drivers to work driving screws and running nuts!

Here's how to tell whether SKIL Drivers will really pay for themselves on your assembly jobs. Figure how many nuts must be run . . . how many screws must be driven. Then multiply by the seconds you'll save on every one when SKIL Drivers take over. You'll find you're figuring in hours *and dollars* before you know it.

SKIL Drivers bring you these big savings because they're extra fast. They're small and compact for use in tight corners . . . lighter and more perfectly balanced for easiest handling . . . and sturdily built for *all* your jobs. Ask your SKIL Tool Distributor for a demonstration today!

Model "304" SKIL Driver with positive clutch. Operator determines point of disengagement by simply releasing pressure.



Model "303" SKIL Driver has adjustable clutch that disengages on predetermined torque. Tension easily adjustable in seconds.

SKILSAW, INC., 5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada:
SKILTOOLS, LTD., 66 Portland St., Toronto, Ont.

SKIL ELECTRIC Tools PNEUMATIC
TRADE-MARK

(*Concluded from page* 130)

ing line was very thin and could be easily removed. Shot blasting was unnecessary. The smallest casting inspected was a signet ring, which showed remarkably minute detail. The heaviest casting inspected weighing not more than 6 or 8 lb, was a pipe fitting with cast threads.

Mr. Croning said that he had made valve housings in straight carbon, vanadium, and manganese steel with 2.5 mm. (0.098 in.) wall thickness. The castings were tested hydrostatically up to 35 atmospheres (approximately 600 psi) and were entirely satisfactory.

Mr. Croning claims numerous advantages for his invention, including: 1. The castings are produced with clean edges, true dimensions, and unchilled surfaces. The new type molds and cores are completely stable in respect to volume change, and they are the equivalent of new permanent molds in smoothness. 2. Owing to the smoothness and high gas permeability of the new-mold material, the casting of extremely thin sections becomes possible. Steel sections as thin as 1/10-in. can be cast. 3. Mold production for a given floor space and labor force can be increased four to six times. 4. Machinery needed for the "C" process is of the simplest and most inexpensive construction.

Abstracted from FIAT Final Report No. 1168 published by the Office of Technical Services, Department of Commerce under the designation PB-81284. The author is a member of the Technical Industrial Intelligence Division of the Department of Commerce.

Form Reserve Units

Foundry, engineering construction, and heavy shop companies appear in the latest list of organizations signing agreements with the Army for establishment of Reserve Units under the Organized Reserve Corps Affiliation Program. This brings the total of signed affiliations to 1508. The new units sponsored by companies maintaining foundries are as follows: Ordnance Heavy Auto-Maintenance Company, Studebaker Corp., South Bend, Ind.; Ordnance Base Artillery & Fire Control Maintenance Company, Gilbert & Barker Mfg. Co., Springfield, Mass.; Ordnance Base Armored Vehicle Maintenance Company, Westinghouse Electric Corp., Springfield, Mass.; Chemical Maintenance Company, American Radiator & Standard Sanitary Corp., Bayonne, N. J.; Ordnance Depot Company, R. Hoe & Co., New York; Engineer Foundry Detachment & Engineer Heavy Shop Company, Blaw-Knox Co., Pittsburgh.

Non-Ferrous Society Joins the FEF

Non-Ferrous Founders' Society has accepted an invitation to become a founding member of the Foundry Educational Foundation. The original invitation was extended by Foundation President Peter E. Rentschler as a result of action taken at the trustees meeting in Cleveland, July 14. Official acceptance by the Non-Ferrous Founders' Society was made at their regular board meeting Aug. 8. As trustees the society appointed G. B. Hazen, vice president, Brass Foundry Co., Peoria, Ill., and W. B. Wilkins, president, American Manganese Bronze Co., Philadelphia.

Concluding action took place at the special Sept. 9 meeting of the foundation at Cleveland. This took the form of an amendment to the code of regulations by means of which the board is empowered to add additional founding members and expand the number of trustees from the present 13 to a total of 17. Thus the way remains open for other qualified foundry societies to become founding members of the foundation.

G. B. HAZEN W. B. WILKINS

Foundries Absorb Engineering Grads

A recent report by the Foundry Educational Foundation indicates that 39 engineering college graduates have been placed in 28 foundries in the North Central and Northeast areas. This total includes only students which FEF had on its records at the close of the 1947-48 collegiate year. As yet no actual graduates of the full foundry program have been available this first year; these will begin to show up next June and should be coming out in greater numbers in 1950.

An incomplete check on number of students from the six FEF schools who worked in foundries during the summer shows the total to have been well over 80. As evidence of the interest on the part of industry in cooperating in the matter of employment, the FEF reports that foundries offered 164 graduate positions, 241 summer jobs were available and 131 co-operative school students could have been placed.

Foundry Honors Old Employees

Each year employees of Waukesha Foundry Co., Waukesha, Wis., receive recognition of their service in the form of certificates, pins and other awards. On these occasions men with a record of 25 years of service receive engraved gold watches, those employed for 15 years are received into the Old Timers Club, and pins are awarded to those completing from 5 to 35 years with the company. At a recent ceremony C. C. Smith, company president, presented the following members of the Old Timers Club with gold watches: Herman Stark, Elmer Russell, Fred Golemgeske, Charles Neufer and Carl Gilbertson. Mr. Smith received the 35-year pin.

Other old timers with from 15 to 35 years of service are: Fred Grant, Phil Mareno, Tony Panella, Frank Charles, Wilbur Zimmerman, Gilbert Funk, Charles Schultz, Harry Dallman, James Congemi, Henry Badciong, Jeff Wright, Paul Golemgeske, Otto Peters, Tony McKukas, Gustave Stark, Edward Vorpal, and C. C. Smith.

Represents AFS at Czech Congress

Lester B. Knight, Lester B. Knight & Associates, Chicago, was official representative of the American Foundrymen's Society at the International Foundry Congress held last month in Prague, Czechoslovakia. The congress was organized by the Czechoslovak Foundry Technical Association and opened Sept. 12. The following two days were devoted to plant visitations, followed by three days of technical sessions. A post-congress tour was scheduled for the following week with trips to various industrial centers of the country.

Centennial Booklet

To commemorate the 100th anniversary of the founding of its plant at Ansonia, Conn., Farrel-Birmingham Co. has published a 32-page centennial booklet for distribution to

(*Concluded on page* 135)

THE Redford CORE BLOWER

CARTRIDGE BENCH TYPE

Users report remarkable increases in quality and quantity of production

When making cores from horizontally split boxes, the work of placing driers and drawing the box is done on the base of the machine

HUNDREDS OF FOUNDRIES ALL OVER THE WORLD ARE USING **REDFORDS** AS AN EFFICIENT LOW COST MEANS OF PRODUCING SMALL INTRICATE CORES

WRITE FOR

complete details and new booklet.

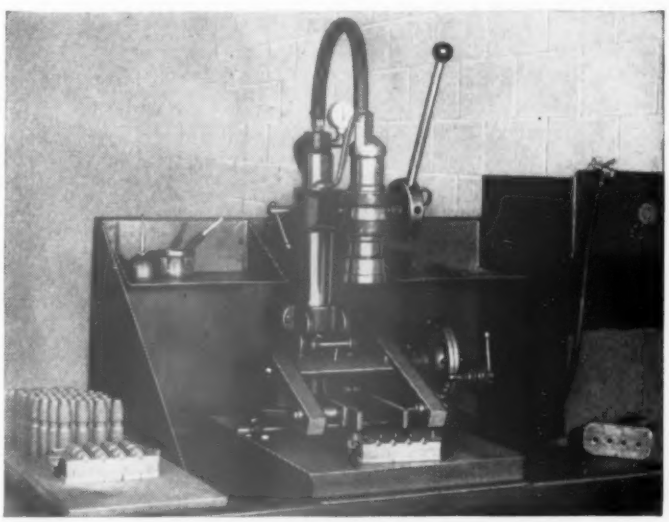
FILLS NEED FOR SIMPLE, FLEXIBLE CORE BLOWER

The Redford Core Blower has been accepted by cost-conscious foundrymen everywhere because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 12 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in 11 additional standard sizes and special sizes furnished where needed.

WE HAVE THE "KNOW HOW" AND WILL ASSIST YOU IN SOLVING YOUR CORE BLOWING PROBLEMS



The new air operated core box clamping attachment is used for the blowing of cores in vertically split boxes. Permits clear working space on machine base—simple to install, operate and adjust—can be swung to one side to clear base for blowing horizontally split core boxes.

Redford IRON & EQUIPMENT CO.

PHONE: REDFORD 8611

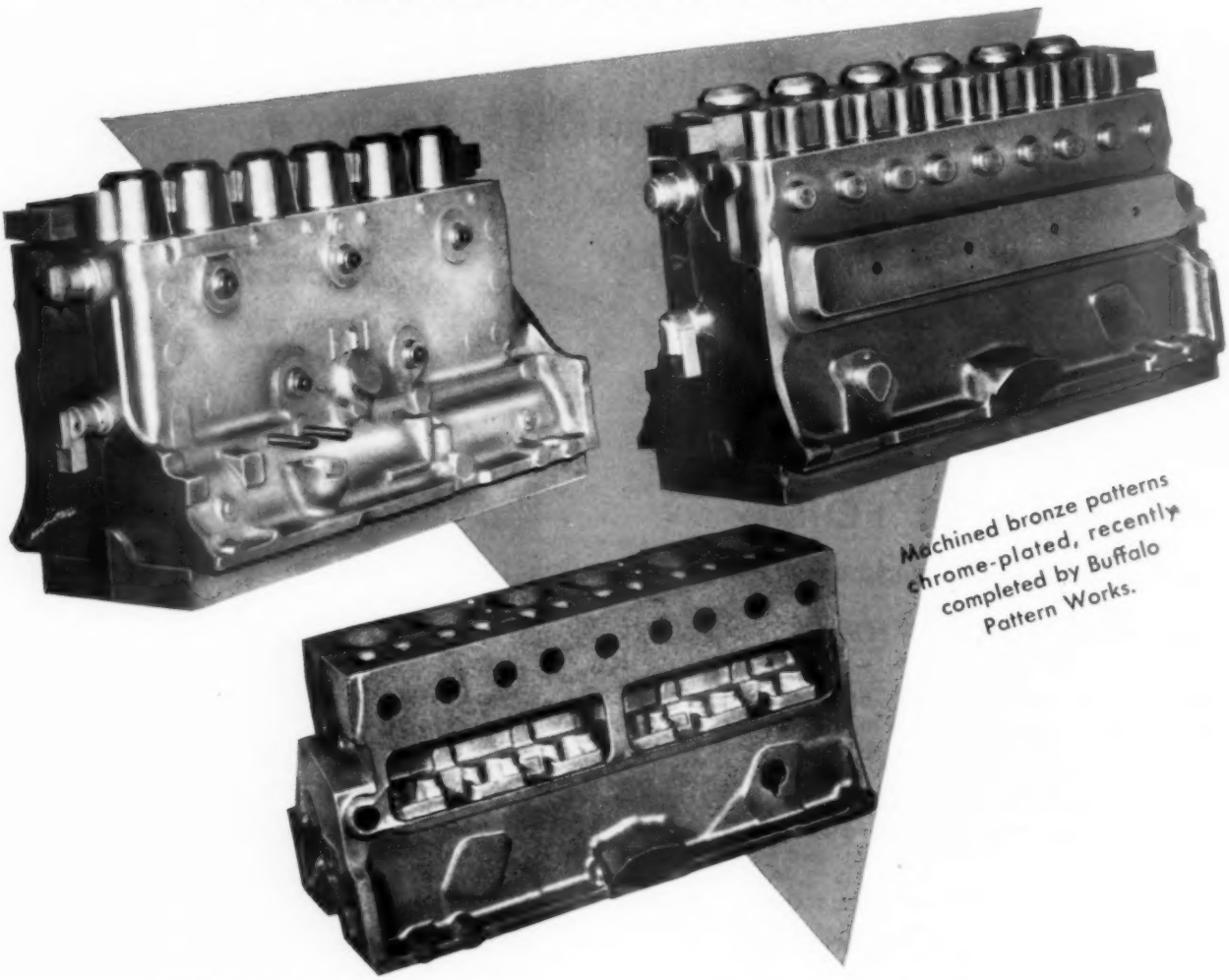
21315 W. McNICHOLS ROAD • DETROIT 19, MICHIGAN

BUFFALO PATTERN WORKS

1893.....1948

55 Years

OF PRODUCTION PATTERN ENGINEERING



Machined bronze patterns chrome-plated, recently completed by Buffalo Pattern Works.

Metal Production Pattern Equipment • Core Gages • Duplicator Models
Blow Core Box Rigging • Wood, Plaster and Experimental Patterns
We invite you to consult us on your pattern engineering problems.

BUFFALO PATTERN WORKS

830 HERTEL AVE. . BUFFALO, N. Y. RI. 3512

(*Concluded from page* 132)
stockholders, employees, customers and friends. The booklet combines an appropriate tribute to founders of the company with pertinent historical data. It sets forth the company's policies with respect to employees, maintenance of plants and engineering developments which are beneficial to users of its heavy machinery and equipment. Interest in the contents is pointed up by liberal use of free-hand sketches of plant scenes and company products.

Offers Management Bulletins

American Management Association, 330 West 42nd St., New York 18, has published several bulletins on miscellaneous subjects, which are available at the prices indicated: Office Management Series—"Incentives and Standards in Office Production," 50 cents; "New Horizons in Office Management," 75 cents; Personnel Series—"Planning Wage and Extra Compensation Policies," "Trends in Employee Health and Pension Plans," and "Plant-wide and Geographical Salary Administration," 75 cents each; Production Series—"How To Develop Competent Supervision," 75 cents.

Personnel series—"Checking the Effectiveness of Employee Communication," "Strengthening Management's Channels of Communication" and "Influencing and Measuring Employee Attitudes", $1 each. Office management series—"Attitudes and Morale of Office Workers," 50 cents.

Publish Proceedings

Proceedings of the Institute of British Foundrymen, Vol. XL, recently published by the institute at Saint John Street Chambers, Deansgate, Manchester 3, England, contain the papers presented to the 44th annual general meeting of the institute and a selection of the papers presented to the branch meetings held during the session 1946-47.

Book Review

Chemical Formulary, Vol. VIII, by H. Bennett, cloth, 448 pages, 5½ x 8½ in., published by Chemical Publishing Co., Brooklyn, N. Y. Price $7.

Listed in this book are a collection of valuable, timely, practically commercial formulas and recipes for making thousands of products in many fields of industry. A chapter on metals and their treatment contains formulas for plating, pickling and stripping compounds; metal cleaner; rust remover; cores wash; core binder; core crack filler; magnesium molding and inhibitors, parting compounds; fluxes and other formulas.

X-ray Development Laboratory Dedicated

WHAT is said to be the world's largest x-ray development laboratory was dedicated at Milwaukee, Sept. 13, when the General Electric X-Ray Corp. named its recently expanded laboratory facilities there in honor of Dr. William D. Coolidge, x-ray pioneer, and director emeritus of the G-E Research Laboratory, Schenectady, N. Y.

Known throughout the scientific world as "father of the modern x-ray tube," Dr. Coolidge, age 75, has been honored by 13 medals and 7 honorary degrees from scientific organizations. He holds 83 patents. In delivering the principal address of the dedication, Dr. Coolidge revealed that a new era in x-ray diagnosis may be ushered in soon when electronic means of intensifying the x-ray image are perfected.

Speakers at the dedication ceremonies, in addition to Dr. Coolidge, included Dr. A. C. Christie, Washington; M. J. Gross and J. H. Smith, vice presidents, General Electric X-Ray Corp.; C. E. Wilson, president, General Electric Co.; Gov. O. A. Rennebohm of Wisconsin; J. H. Clough, president, General Electric X-Ray Corp., and W. D. Crelley, merchandising manager of the company.

A feature of the new William D. Coolidge Laboratory is a high-voltage experimental section, isolated from the remainder of the building by concrete walls 25 ft high and 3 ft thick at the base, where experimental work is conducted on units such as the 2,000,000-volt machine shown in the accompanying illustration.

Two-million-volt x-ray unit in the new William D. Coolidge Laboratory recently dedicated by General Electric X-Ray Corp. at Milwaukee

Man-to-Man

ON THE MOLDER'S BENCH

"The Old-Age Hurdle"

By RALPH L. LEE

QUITE some time back a fellow was telling me about a foundry in his town that had managed to sail along for some thirty years or more on a steady, even keel. The founder and principal owner was heading up close to eighty. But in spite of this and the fact that his two sons were supposed to be runing the business, the old codger insisted on getting down bright and early every morning, to fiddle around on this and that while getting in everybody's hair.

The bosses, including the sons, felt that the old man had long since earned the right to loaf and wished to the Lord he'd do more of it and at home too. One October he did take a real rest and his last one. The following April the business folded. Whatever it was the old man had that kept the business going he must have taken it with him.

There probably were reasons within reasons I didn't hear about, but the town folks weren't suprised the way things turned out, having felt for quite some time that the boys lacked what the old man had.

If this story was the only one of its kind I had ever head I don't think I would have paid so much attention to it, but I've heard a lot of others like it and still keep hearing them. The more I hear, the more I wonder what it is about getting old that seems to build up a wall which prevents older people from getting over to the young the benefit of all the things they have been through.

This isn't any idle speculation either, for I'm no spring chicken myself with a 23-year-old son marching right on into the thick of things. Mother and I have tried our darndest to keep in mind that we don't own our son and that he is a separate and distinct person who just happened to come our way just like the neighbors who moved in next door.

I honestly believe that this stand we have taken has paid off, for the boy seems at least to feel free to take any advice we may give him with a grain or two of salt and to weigh it on the basis of the merits he sees in it, rather than on a basis of from where it came. Sometimes I suspect when my suggestion is an even draw with his own or somebody else's he's apt to turn mine down in favor of the others. And this is all right with me; it's the way it should be for it seems to be proof of a comfortable fellowship.

In this connection, I'd like to say this too—the more I see of younger people and their attitude toward their elders the more firmly I am convinced that taking it all in all they probably have sounder attitude toward their elders than the elders have toward them. The more I think about this the more I begin to suspect that there is more to this age discrimination thing than the weakening of muscle, mind and memory.

I don't think I have reached a point where my memory has begun to fail, in fact I'm quite sure of it, for my son rarely brings up a situation that a similar one in my past doesn't pop right up in clear focus with my tongue hanging out to tell all the details. I'm not sure, but maybe, this vivid memory of the past and the irresistable urge to divulge all the gruesome details might be the Ethiopian in the woodpile which prevents the old and the young from getting together more frequently.

If I were young again I can't think of anything that could possibly be more disheartening than to think that nothing new was ever going to happen to me. I believe I'd feel like quitting if I knew for a fact that every problem I would ever be up against had already been solved and all I had to do was to get in touch with some old greybeard, or my Dad, and get a clean-cut, fool-proof answer.

If I know my young people there isn't much danger of them getting into this kind of a rut, for most of them are pretty wide-awake and have seen enough examples of their elders muffing the ball to know for a fact that old age doesn't guarantee infallibility by a long shot. Which to my way of thinking blows up in bold relief the tremendous difference between unchangeable principles based upon time-proven fact and the thousand and one different ways in which such principles can be applied. One is set and the other open as all out doors.

I'm beginning to think that the most common mistake we oldsters make in dealing with youngsters is failing to recognize the difference between the principles our life-long experience has proved to be true and the relatively unimportant cut and try and frequently bungling

(*Concluded on page* 138)

Highest Quality Steels
MADE WITH VANCORAM FERRO VANADIUM

The high quality of Vancoram Ferro Vanadium, consistent from lot to lot, assures the steelmaker closer control during production and a finished product of unexcelled microstructure and physical properties. The alloy is produced in the following grades to meet the requirements of various products and manufacturing technics:

	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

Large stocks are carried of all grades of alloys, and they can be supplied in any of the standard lump, crushed, or mesh sizes.

Our metallurgists will be glad to assist you in the application of Vancoram Ferro Vanadium to meet your specific requirements.

MAKERS OF FERRO ALLOYS VANCORAM *CHEMICALS AND METALS*

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

(*Concluded from page* 136)

methods we happened to use to put them into practice.

It certainly is human nature to want to get things down pat. Making decisions will always be one of the hardest jobs any of us are called upon to do. So it isn't surprising then that whenever we can we try to make decisions that will stay put. As we grow older these patent and pet decisions pile up until we have quite a library of them, a library that covers just about every subject with which we have ever come in contact.

The more successful we think we are, or are told we are, the more valuable our library seems to be, even though we know down in our hearts that it contains an awful amount of fiction. If we have kidded ourselves into thinking that we really are outstanding examples of top-notch success, which we single handed have hewn out of solid rock by sheer dint of sweat, determination, perseverance, self control and all those other noble copy book virtues, then the chances are we will forever be dragging down these volumes for benefit of the young whether they are in a mood for it or not.

On the other hand, I honestly believe that after a person has served his apprenticeship and worked through the years to a point where his work now stands on its own two legs, able to speak for itself and for him, he has a perfect right to feel that he has arrived, arrived at some definite place at least, and let us hope one in the neighborhood of where he wanted to be. Having arrived and without the slightest chance of turning back I think such a traveler, can without apology, speak quite freely about his trip to those who care to listen, provided his story is freely sprinkled with jokes about himself.

However, when it comes to a person who is positively convinced he is God's gift to mankind and to the point where he begins sanctifying the way he happens to comb his hair, wears his clothes, eats his meals or brushes his teeth—together with all of his other personal indiosyncracies—when he begins to sanctify all of these inconsequential personal habits as the rules of life for everybody, he's going to be one grand pain in the neck, no matter how much money he's got OR how old he is.

Old people don't need to defend their age or what they now know is so. They have earned the right to enjoy the advantage old age provides and to enjoy it free of competition with the young. If in our hearts success, as we interpret it, is ours we don't need to defend it or to sell it. If it isn't ours we can hardly reminisce it into existence, although we can point out to youngsters how we missed the boat.

I am glad that, to the young, I am now being spoken of as on the oldish side. By all that is holy I am going to do everything in my power to keep from being a pain in the neck to my son and younger associates, not by trying to make myself one of them but by honestly being my age and enjoying it.

Since there are so few left maybe our old time foundrymen in planning their vacations had better figure out some safe way to leave their valuables behind them, for after all we can't take them with us.

"You Wouldn't Believe It Anyway"

Editor's Note: The following sales report was received by a manufacturer of foundry equipment from one of its salesmen. While hardly classified as recommended practice, the procedure followed by the foundry operator in question at least is different.

I haven't time to tell you all I saw and learned here. You wouldn't believe it anyway.

They have four molders making cast iron washers and other castings consumed locally. Their product sells for 6 to 8 cents per pound.

They have no core oven and see no need for same. The following is how to make good cores by tried and proven means.

You go out here in the apple orchard and get sand which sells for all you can get in a truck for $1. This sand is a little too fine to dry just right so you go out here in front of the shop and gather the gravel that has aged by being weathered free of the macadam road. The large pieces stick to the road so you don't have to worry too much about getting any that is too large. Sometimes the state puts on tar that holds onto the gravel too tight to weather loose, but the cars loosen up enough if you collect it over a little longer stretch. This, of course, costs you nothing and the state keeps putting it back so that you never run out of your source of supply.

So much for the sand. For binder you get some of your wife's flour and mix it with the oil that you find on top of the paint in paint cans. Watch out that you don't get any of the paint. Now if the gravel that you gathered has been collected just right, you have just enough tar which, together with the flour and oil, will make just the right amount of binder if you dry right.

To dry you get the right size salamander and build a good coke fire, let it burn down well and then, dependent on the size of the core, you set the core right on top of the salamander for a little while, then off to one side. Of course, you have to be an experienced molder to do this just right, but if you practice a while you can make a middling good core. If it smokes too much, you have too much binder, but if you do all this just as I have told you, you get a wonderful core that makes a hole in the casting almost exactly like the core itself.

As I said, I could tell you a lot more, but you wouldn't believe it, and even you wouldn't sell a useless thing like an oven any longer.

At the end of two-hours' discussion I didn't find these people good oven prospects. You will need a missionary to handle this.

T. E.

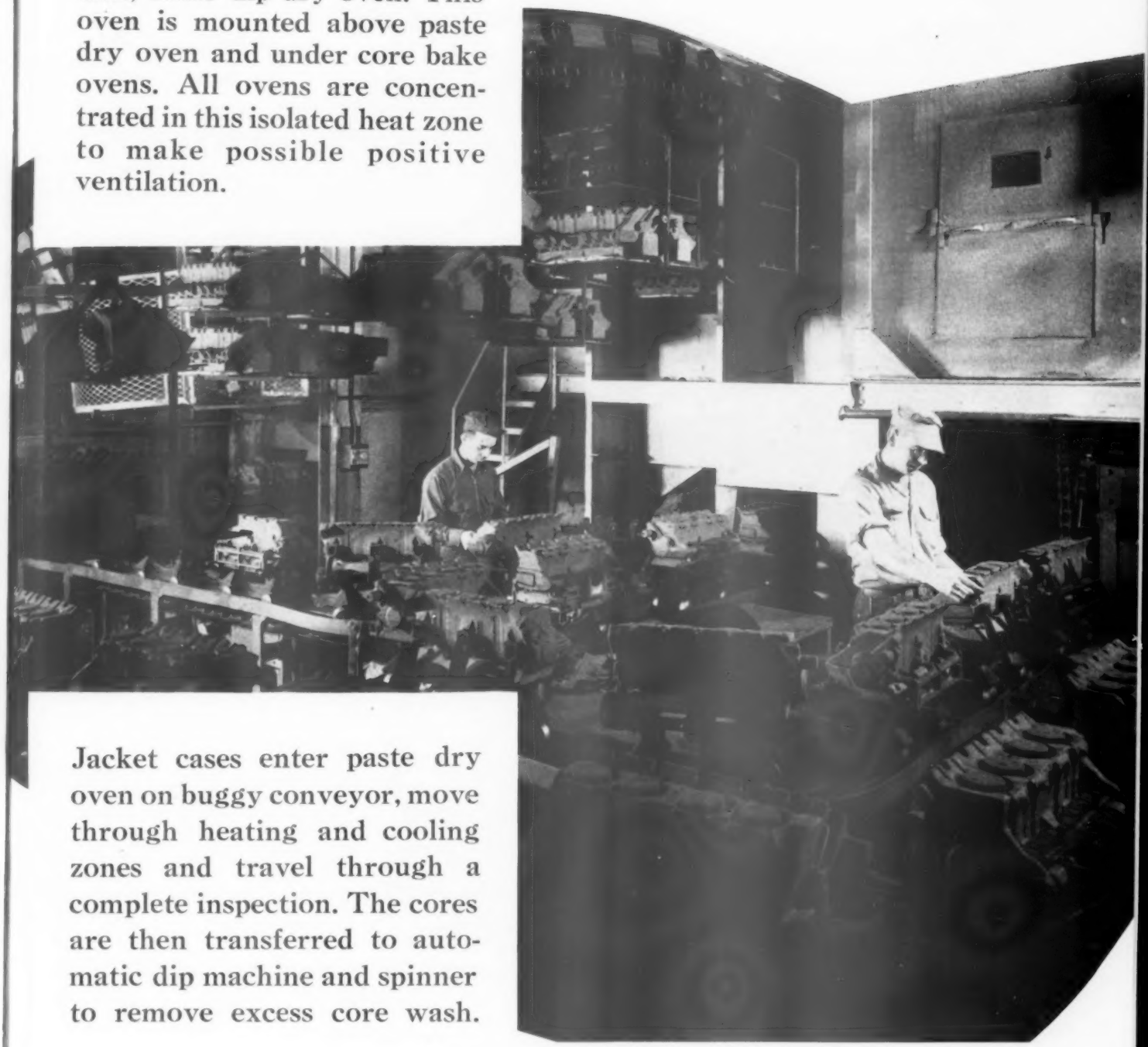
P. S.—It has been found that the wearing of shoes in no way interferes with good molding practice.

Book Review

How To Prepare and Maintain a Supervisors' Policy Manual, by Eileen Ahern, paper, 71 pages, 6 x 9 in., published by American Management Association, 330 West 42nd St., New York 18. Price $3.

Based on a survey of company practices, this study is intended as a handbook for those charged with the preparation of supervisors' policy manuals. It assembles the practices of a number of companies which have had experience with manual programs and deals with the actual techniques of collecting and appraising source material, writing the policies and procedures, coding and indexing them, and revising the manual as new material and changes develop. Advantages and disadvantages of various procedures, as they have worked out for other companies, are reported so that each may be judged from the viewpoint of the individual firm.

Cores transported by monorail conveyor, after dipping operation, enter dip dry oven. This oven is mounted above paste dry oven and under core bake ovens. All ovens are concentrated in this isolated heat zone to make possible positive ventilation.



Jacket cases enter paste dry oven on buggy conveyor, move through heating and cooling zones and travel through a complete inspection. The cores are then transferred to automatic dip machine and spinner to remove excess core wash.

A cooperative effort of Ford Motor Company engineers and Giffels & Vallet, Inc. developed this high production core room at the Rouge Plant Foundry.

GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING, DETROIT

Book Review

Industrial Electric Furnaces and Appliances, Vol. II, by V. Paschkis, cloth, 320 pages, 6 x 9 in., published by Interscience Publishers Inc., New York. Price $8.

This second volume covers a field of furnaces in which diversity in design is much more pronounced than in the field covered by the first volume. In the author's opinion any furnace problem should be how to heat the charge to the required uniform temperature at lowest cost. Therefore the considerations of uniformity that govern the required heating time are discussed first.

The volume is divided into three chapters. The chapter on resistance furnaces and appliance covers indirect-heat furnaces and deals with the design of parts, as well as of entire furnaces, and covers radiation, convection and conduction furnaces. Direct-heat resistance furnaces also are discussed but this section is short because there are few publications on this subject and users of these furnaces treat information about them guardedly. In the field of resistance appliances, the author attempts to analyze the basis of design and application.

Electrical fundamentals of induction and capacitance heating are discussed in the second chapter with emphasis on the thermal aspects and the relationship between electrical and thermal problems in wide variety.

The third chapter deals with the selection of furnaces for different applications and includes a review of types of heating.

Device Simplifies Dumping of Poured Molds

AN effective mold dumping device, illustrated here, is employed in the brass foundry of the Crane Co., Chicago. Molds are closed on a four-wheel truck which is pushed along a track to the pouring position. After pouring and sufficient cooling the molds are pushed to the end of the track where they drop down a sharp incline and are stopped against a bumper. The abrupt stop causes the mold to slide off the truck onto the floor conveyor seen in the foreground. This conveyor carries sand and castings to a shakeout machine at upper left.

Each mold track is double-decked, except for the inclined portion at the end which is pivoted to engage either the upper or lower deck, subject to control by a compressed-air valve. With the exception of the station where the operator is working, all of the inclined-track portions shown in the illustration are in the lower deck position. The inclined section of the track from which a mold has just been dumped has started to move toward its lower position. The mold truck will then roll onto the lower track and proceed by gravity back to the molder's station.

Opportunities In Metallurgy

American Society for Metals, Cleveland, has published a 96-page booklet prepared by John W. Sullivan, American Iron and Steel Institute, with the advice and co-operation of the ASM advisory committee on metallurgical education.

Entitled "Your Career in the Metallurgical Profession," the booklet is published in the interests of the metallurgical profession and has no commercial purpose other than to point up the need for trained metallurgists throughout the world. Its purpose is to help high school students decide if they are fitted and interested in metallurgy, and to emphasize the opportunities and profits in the industry.

Taylor Chain Marks Its 75th Year

S. G. Taylor Chain Co., Hammond, Ind., this year is celebrating its 75th anniversary under one management. The beginning of the company dates back to 1873—a date which marks the company as one of the cornerstones in the country's vast industrial economy. Founded in Chicago by S. G. Taylor, the plant was moved to Hammond in 1911. S. G. Taylor Jr. joined the organization in 1888, succeeded the founder in 1901 and is still active in the affairs of the company today. His son, E. W. Taylor, now heads the company as president and general manager.

Book Review

The Copyright Law, by Herbert A. Howell, cloth, 302 pages 5¾ x 9 in., published by Bureau of National Affairs Inc., Washington. Price $5.50.

Based upon a thorough revision of a series of lectures on copyright originally delivered to graduate law students, this second edition includes various new cases interpretative of the copyright law. Special attention is called to the new codification of the statute by Act of Congress of July 31, 1947. Text references include both the section numbers of the Copyright Act of 1909 and the new section numbers of the codification.

Operates Efficiently in continuous service!

JOY WG-9

A DEPENDABLE AIR COMPRESSOR

CYLINDER LINERS ARE REPLACEABLE ON THE JOB

20 TO 150 P. S. I.
153 TO 822 C. F. M.

The Joy WG-9 vertical compressor is produced in sizes 20 to 150 P.S.I., 153 to 822 C.F.M., and is designed for 24 hour per day service where necessary and for specialized requirements in many industries.

HEAVY DUTY

SIMPLE BLOCK FOUNDATION

FULL FORCE-FEED LUBRICATION

ANTI-FRICTION MAIN BEARINGS

LONG LIFE "DUAL CUSHION" VALVES

Consult a Joy Engineer or write for bulletins

WADE 1307

SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BUILDING, PITTSBURGH 22, PA.

New Swedish Metal Research Institute Opened

By ERIK O. LISSELL
Chief, Foundry Research Division
Sveriges Mekanforbund
Stockholm

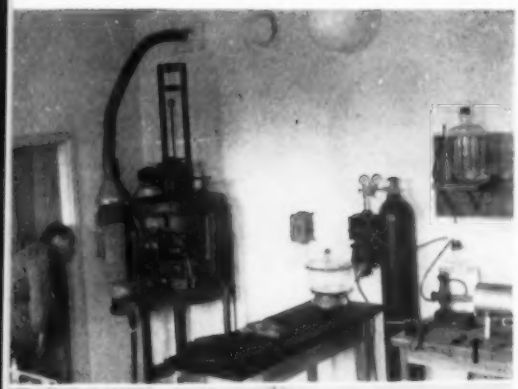
A NEW metal research institute was opened recently in Stockholm. The institute, which is called "Metallografiska Institutet (The Metallographic Institute)", is to continue the successful work of the institution bearing the same name which was founded by Prof. Carl Benedicks in 1920. Until 1946 the institute was housed in the old buildings of the College of Mining and Metallurgy of the Royal Institute of Technology. The old institute was supported mainly by the well-known organization the "Jernkontoret"—the Swedish Ironmasters Association—and was engaged primarily in research related to iron and steel.

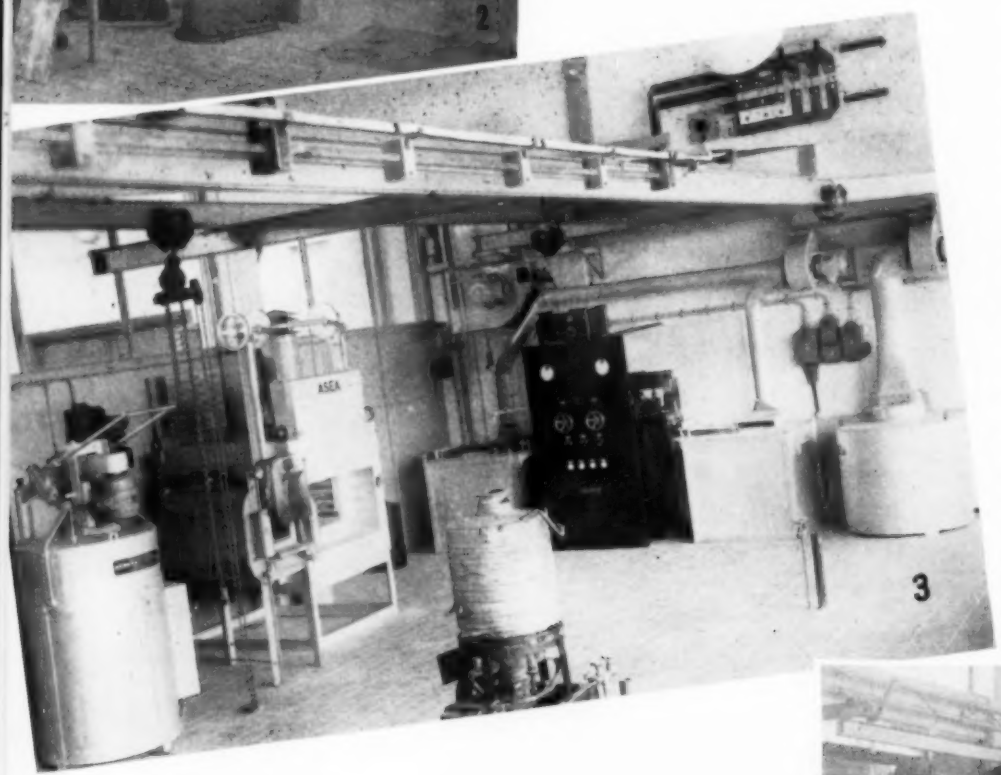
It has long been felt that the accommodations were too crowded and not up to date, and in 1942 the board of directors of the institute and the Jernkontoret asked the Swedish government for a new and better building. The government suggested that the new institute should cover a wider field and deal not only with ferrous problems but also with nonferrous, and asked for a broader support from industry. As a result, the iron and steel, the nonferrous metals and the mechanical engineering industries got together and formed the Society of Swedish Metal Research which supports the new Metallographic Institute. Branches of the metal industry which previously were not engaged in co-operative research formed new bodies for applied and fundamental research. These research bodies directly support the new institute.

The new institute is beautifully situated in a park in the northern part of Stockholm. On the grounds are one main building and one building for melting and heat treating. The two buildings are connected by a tunnel.

The main building houses offices, machine and carpenter shops, physical, chemical, x-ray, and metallographical as well as other service laboratories and a foundry laboratory. The building provides a net floor space of about 17,500 square feet. The furnace and oven building consists of one bay roughly 18 feet high designed for melting, molding, casting, forging and cleaning and one lower ceilinged bay which contains furnaces, ovens and instruments for heat treating, vacuum fusion and

(*Concluded on page* 145)





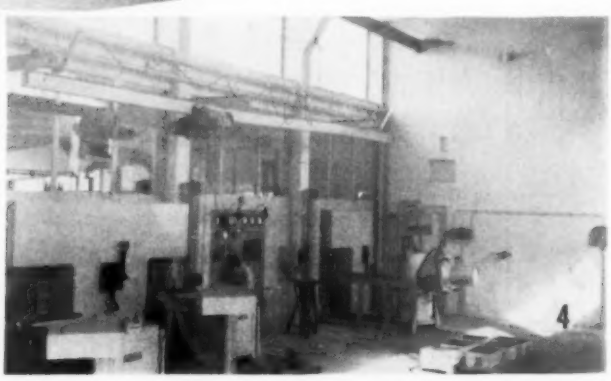
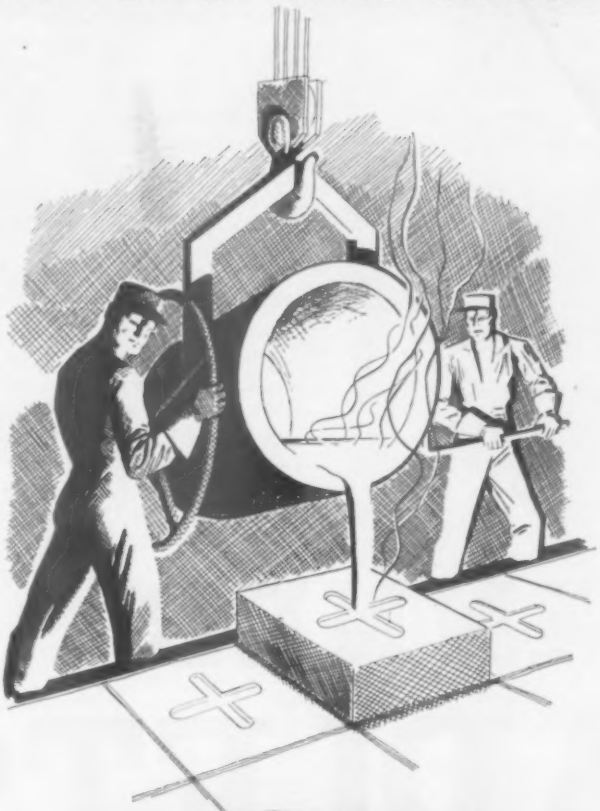
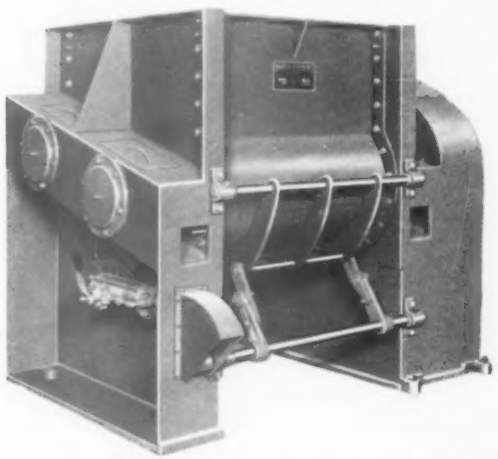


Fig. 1—Section of institute's sand laboratory
Fig. 2—Sand preparation and cleaning units in the melting and casting laboratory
Fig. 3—Laboratory for heat treating research
Fig. 4—High-frequency melting furnaces

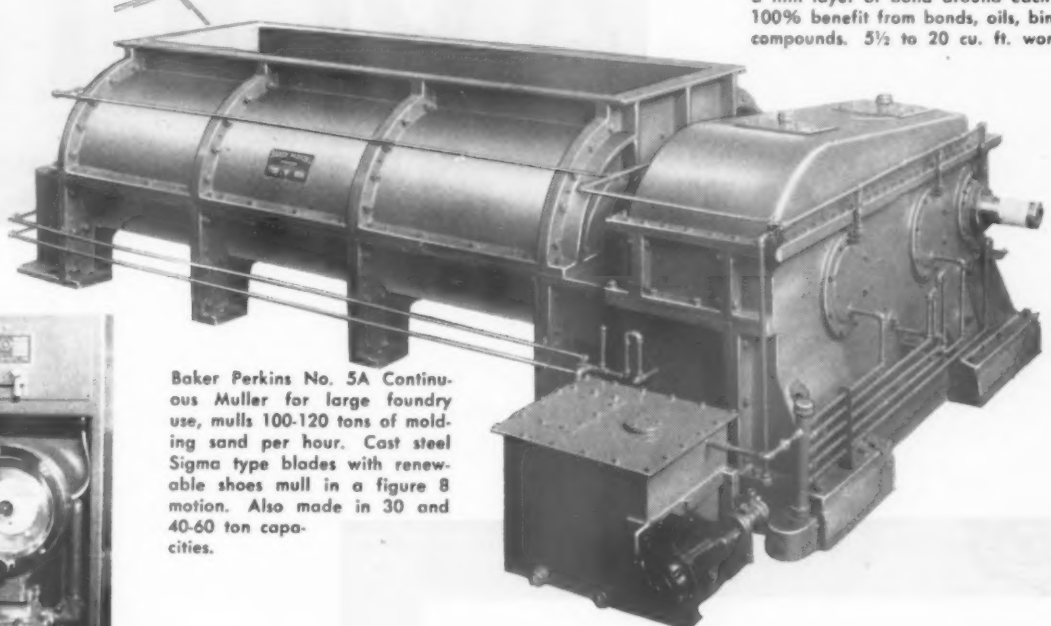
FOR BETTER CASTINGS, USE BETTER SAND MIXERS

One sure way to produce better castings is by improving your core sand. Baker Perkins foundry equipment can help you do this important job. Baker Perkins continuous mullers, batch-type core sand mixers, liquid meters, and traveling sand scales are doing an efficient job in a great many of America's most successful foundries. Any one or all of these units may be integrated into your production system to help you reduce the percentage of faulty castings and thus help increase your profits. Our engineers will be glad to study your requirements and make specific recommendations.





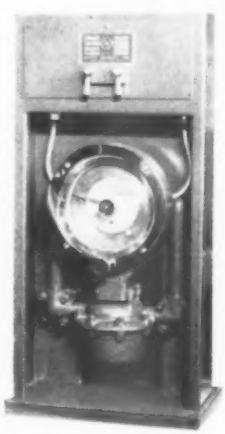
Baker Perkins "Unidor" Core Sand Mixer. Rubs, stirs, and kneads in one operation. Distributes a thin layer of bond around each grain, assuring 100% benefit from bonds, oils, binders, and other compounds. 5½ to 20 cu. ft. working capacities.



Baker Perkins No. 5A Continuous Muller for large foundry use, mulls 100-120 tons of molding sand per hour. Cast steel Sigma type blades with renewable shoes mull in a figure 8 motion. Also made in 30 and 40-60 ton capacities.

MEMBER

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

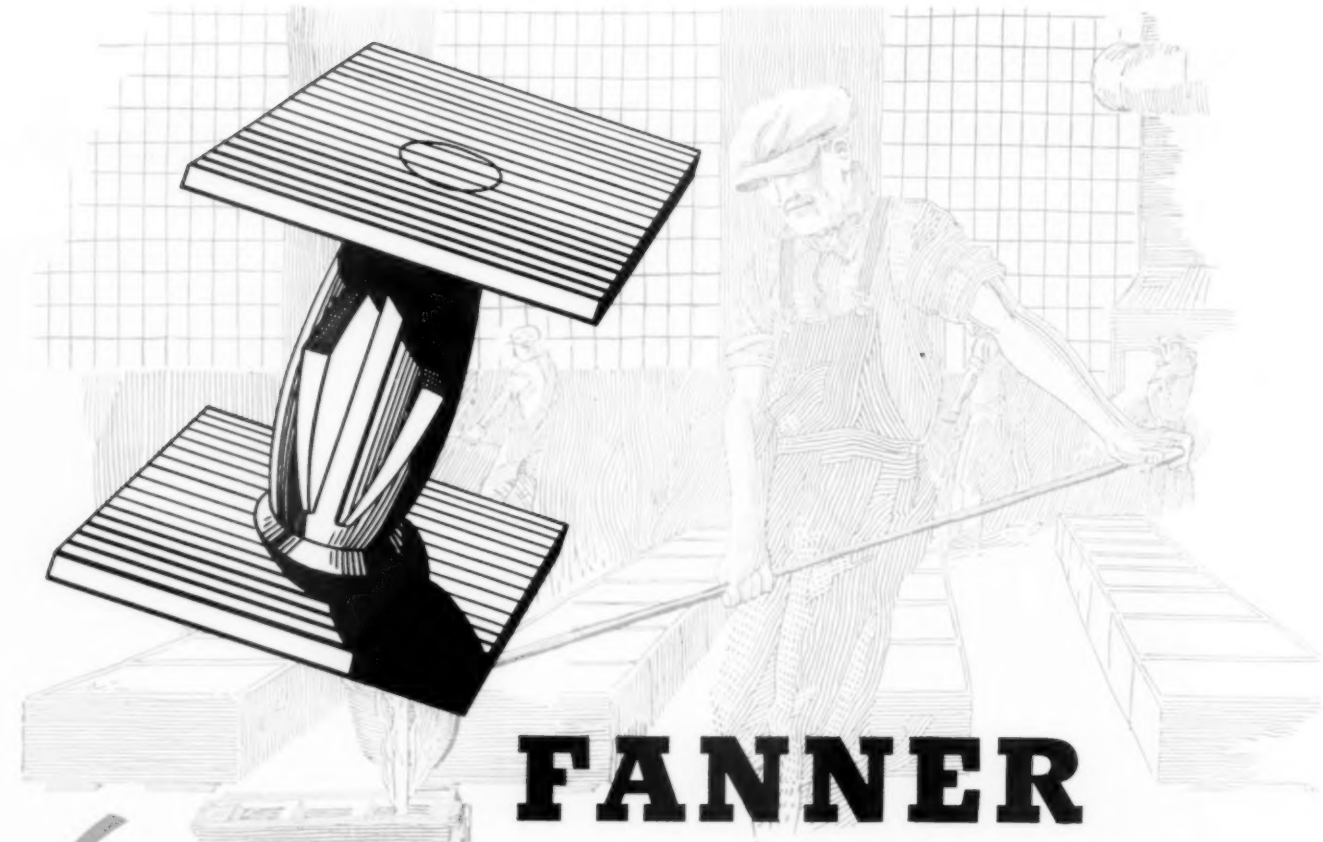


Baker Perkins Liquid Meter for accurately and automatically measuring water or binding oil flowing into each B-P Core Sand Mixer. Simple! — just dial the amount of liquid desired and the control mechanism does the rest. Capacities up to 600 lbs.

BAKER PERKINS INC.

FOUNDRY EQUIPMENT SALES

SAGINAW, MICHIGAN



FANNER CHAPLETS and CHILLS

In the amazingly comprehensive variety of precision-made chaplets and chills Fanner offers, you'll undoubtedly find *special* chaplets and chills that can effect sharp production economies over those now being used in your foundry. And save on the price too, because they're "standards" with Fanner. Why not send samples of your present chaplets and chills, mentioning what used for, and let our engineers go into a huddle about it. No obligation, of course.

THE FANNER MFG. CO. • CLEVELAND 1, OHIO

In Canada: CANADIAN FANNER, LTD.
Hamilton, Ont., Canada

OVER 100,000,000 IN STOCK

Birdseye view of the Fanner Brookside Park plant in Cleveland

(*Concluded from page* 142)

vacuum melting of small batches. Each of these two bays occupies a floor space of roughly 2000 square feet. The basement of the building provides space for storage, compressor, transformers, wash rooms and a small machine shop.

The institute when fully equipped will house all kinds of instruments and apparatus for fundamental research in metallurgy, metallography and physics. Service departments, such as shops for metal and wood working, preparation of test bars and specimens, melting and heat treating departments and chemical laboratories, will be equipped up to date.

Spectrographs, apparatus for x-ray crystallography, microscopes, instruments for determining different physical constants, equipment for creep and corrosion testing, different machines for the determination of the strength of metals, equipment for vacuum fusion, etc., are or will be installed in the institute.

Has Several Melting Units

The laboratory for melting and casting is equipped with a 100-KVA, 2220 cycles completely automatic high-frequency set, to which can be attached one 330-lb open furnace, one 66-lb open furnace and one 110-lb vacuum furnace. The furnace building also contains a 22-in. cupola especially equipped for the study of the behavior of the charge material in such furnaces. A couple of gas-fired crucible furnaces complete the installation.

Molding and core sand is prepared in a small sand preparation unit, consisting of a muller and a core mixer. Molds and cores are baked in a 24-KVA electrically heated oven with three individual thermostats. The shakeout and cleaning department consists of a shakeout grind, sand blast cabinet, a grinding machine and a work bench.

The heat treating department is equipped with a 35-KVA salt bath furnace and a lead pot. A 40-KVA batch furnace makes treatments at high temperatures possible. The heat treatment of light metals can be carried out in a 12-KVA convection furnace. Special tests at very high temperatures and under vacuum can be conducted in a couple of special resistor type furnaces. This department also includes equipment for the analysis of gases in metals by means of vacuum fusion.

Besides the equipment mentioned, the foundry laboratory has access to a sand and chemical laboratory. The sand laboratory is equipped with mixers, apparatus for determination of the properties of foundry sands at room temperature as well as at elevated temperatures. Most of the equipment has been built by the laboratory in connection with the development of Swedish standards for testing foundry sands.

A special core oven which works with a very high degree of uniformity and a high temperature oven for determining the compression strength at elevated temperatures,

Fig. 5—Dilatometer employed in the sand laboratory

heat expansion tests and shock tests are shown in the accompanying illustrations.

The foundry laboratory, which serves the Swedish foundry industry as a central research and control station, works in close co-operation with the Metallographic Institute and utilizes the service laboratories and other departments of the institute when necessary.

Book Review

Photoelasticity, Vol. II, by Max Mark Frocht, cloth, 505 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York. Price $10.

This book is a treatise on advanced principles and methods. It includes essential elements of the theory of elasticity, a critical examination of the influence of the physical constants on the state of stress in two dimensions, a broad survey of the methods for the determination of the sums of the principal stresses with special emphasis on the Numerical Solution of Laplace's Equations and also the theory and technique of three-dimensional photoelasticity with applications to stress concentrations.

Bibliography Pool

Formation of a pool of unpublished bibliographies on scientific and technical subjects has been announced by the Special Libraries Association. Subjects include organic and agricultural chemistry, metallurgy, physics, welding, combustion technology, and others. The pool is housed in the library of Battelle Institute, Columbus 1, O., from which loans of bibliographies are made. Complete listing may be secured from Ralph H. Hopp, technical librarian of the Battelle library, who serves as chairman of the Special Libraries Association Bibliography Committee. His committee is also interested in possible inclusion of other unpublished bibliographies in the pool.

Facts About Profit

Metropolitan Life Insurance Co., One Madison Ave., New York 10, has issued a report entitled "Telling Employees About Business Operations: Profits." While the report deals primarily with the subject of profits, it shows the techniques used to obtain better understanding by giving employees and the public the facts about business operations.

After examining the whole background of profits, including the relationship between profits, prices and wages, the report shows how employees are told about profits.

Book Review

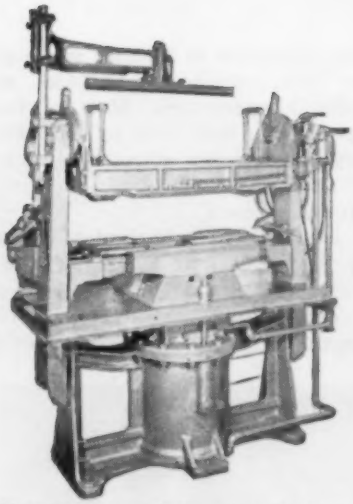
Who, Me? by Arthur O. England, paper, 24 pages, 4½ x 7 in., published by National Foremen's Institute Inc., Deep River, Conn. Price 25c.

This pamphlet has been prepared as a brief, handy guide for all supervisors—division, department heads, and foremen—for achieving better human relations. It is not intended to supplant existing company policies and regulations but is meant as a convenient digest of the purpose and thought behind the personnel management program.

Analytical Methods

Aluminum Research Institute, 111 West Washington St., Chicago 2, has published a new 103-page booklet entitled "Analytical Methods for Aluminum Alloy" which describes the proper method for sampling aluminum alloy casting ingot, and recommended methods of determining composition by chemical, photometric and spectrographic procedures.

#193 Osborn Blower, draw piston type

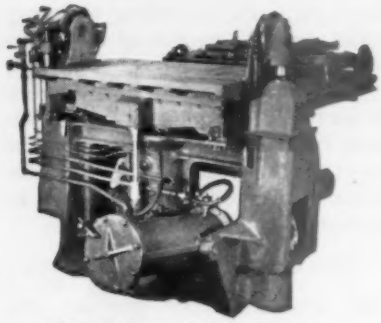


#333 Osborn Jolt-Squeeze Rollover

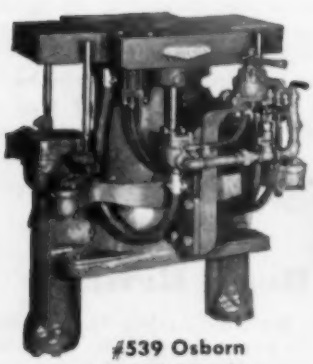
#94 Osborn Core Blower

#442 line Jolt Rockover Machine

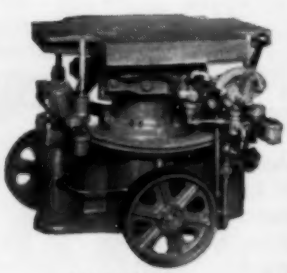
#146 Osborn Core Box Drawing Machine



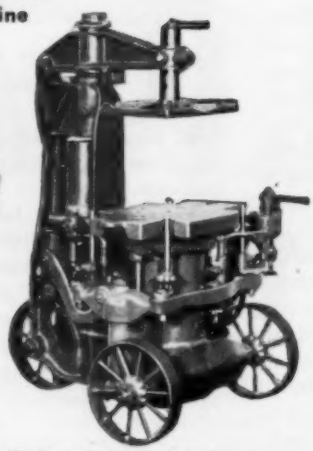
#405 Osborn Jolt Rollover



#539 Osborn Jolt Strip Machine



#559 Osborn Jolt Strip Machine



#710-J Osborn Jolt-Squeeze Strip Machine

#210-PJ Osborn Jolt Squeeze Machine

#413 Osborn Jolt Rollover

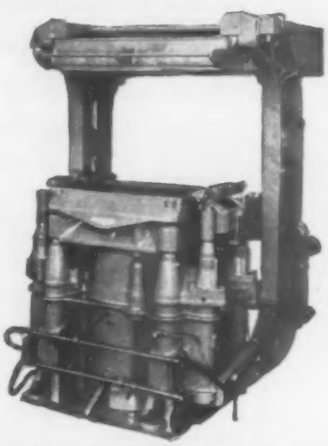
#42 Osborn Hand-Operated Rockover Core Machine

Many types not illustrated. Write or wire for complete information.

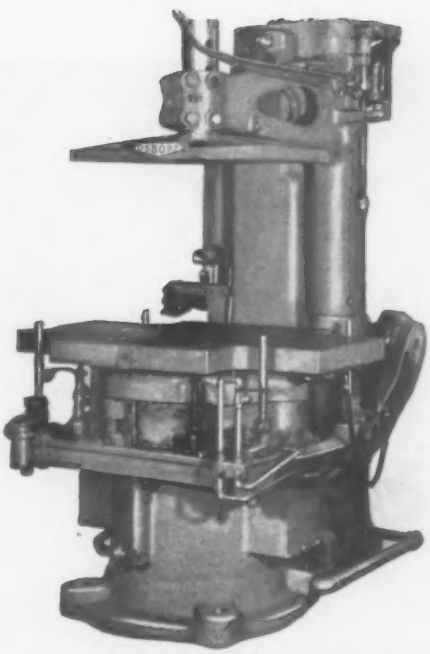
THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

OSBORN features the MOST COMPLETE LINE OF MOULDING and CORE BLOWING EQUIPMENT for foundries

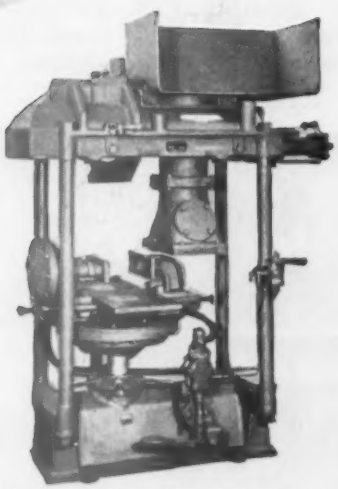
#275-J Osborn
Jolt-Squeeze Machine



#1024 Osborn Jolt-Squeeze
Strip Machine



#724-PJ Osborn Jolt Squeeze
Strip Machine



#93 Osborn Core Blower

MEMBER

MANUFACTURER'S ASSOCIATION, INC.
FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES

ACTIVITIES OF FOUNDRY Groups

Central Ohio

APPROXIMATELY 275 members and guests of Central Ohio Chapter of the AFS attended the annual picnic and outing at Columbus Riding Club Aug. 21. The afternoon was taken up with the usual games and sports, including a baseball game, horseshoe pitching and dart throwing.

The ham dinner was followed by the distribution of over 100 door prizes contributed by friends of the chapter. The day's activities were topped off with a program of professional entertainment.

E. M. Durstine, Keener Sand & Clay Co., was chairman of the picnic committee. Other committee members included Bill Huffman, Karol Whitlatch, Fred Fuller, Walter Deutsch, Dan Krause, R. A. Willey, Gray Lummis and Howard Morgan. —*H. W. Lownie Jr., Battelle Memorial Institute.*

Chicago

AUG. 14 was the date of the annual stag outing and golf of the Chicago Chapter, AFS, and the place was the customary one—the well-appointed Lincolnshire Country Club in Crete Township, Ill. While the weatherman might have co-operated more fully with a higher thermometer reading, attendance of 960 chapter members and guests slightly exceeded 1947 and was less than 200 short of the all-time high established in 1946.

As would be expected, golf was the principal day-time attraction. For those preferring less-strenuous physical exertion, the afternoon program provided a horseshoe pitching tournament and exhibition, four boxing bouts, two wrestling matches, and a weight-guessing contest. Elbow-bending activities were general and conducted to the accompaniment of music and song inspired by four wandering singing instrumentalists.

At 7 p. m., the focal point was the Big Top where a country fried chicken dinner was served. Then followed the presentation of a generous array of sports and door prizes. Several floor show acts brought the evening program to conclusion.

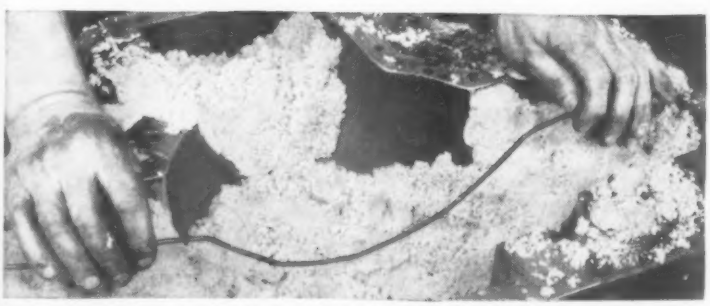
The chapter's entertainment committee arranged and directed the outing. Robert M. Jones, superintendent of foundries, South Works, Carnegie-Illinois Steel Corp., is chairman of the committee, and Harry E. Cullen, director of recreation of the same company, was outing secretary.

Other members of the committee included: M. H. Beatty, Hill & Griffith Co.; J. J. Behen, National Carbon Co.; G. J. Biddle, Illinois Clay Products Co.; Oscar Blohm, Triangle Foundry Co.; R. H. Burnell, Federal Foundry Supply Co.; E. J. Cullinan, Western Foundry Co.; J. C. Day, American Steel Foundries; F. E. Fisher, Hydro-Blast Corp.; G. P. Fisher, Whiting Corp.; F. B. Flynn, S. Obermayer Co.; H. A. Forsberg, Continental Foundry & Machine Co.; J. C. Gore, Werner G. Smith Co.; E. E. Henry, Hammond Brass Works; C. C. Kawin, Charles C. Kawin Co.; G. S. Kennelley, General Refractories Co.; R. A.

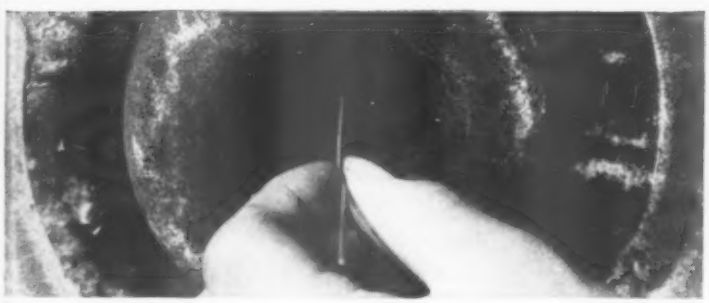
(*Continued on page* 151)

CENTRAL OHIO Chapter of the AFS held its annual outing Aug. 21 at Columbus Riding Club. Photos are by courtesy of W. H. White, Jackson Iron & Steel Co.

gives sharp edges



KORDEK's collapsibility is another advantage. Gases permeate KORDEK easily and evenly.



KORDEK cleans easily, doesn't adhere to surfaces of castings or core boxes.

● Sharp edges, soft interiors, permeability and easy drying are just a few of the advantages you get when you use KORDEK.

When you consider KORDEK's reduced baking time—and the fact that you can use KORDEK in smaller quantities than most dry binders, you realize what an economical product this is. And how it can help your profits by increasing production of perfect castings.

Write our Technical Division for consultation and information—without obligation.

Corn Products Sales Company
17 Battery Place, New York 4, N. Y.

KORDEK

THIS MONTH, 62,562* BUYERS OF CASTINGS WILL READ THIS AD...

This is one of a series of 6 full page ads emphasizing the expanding industrial acceptance of Brass Castings. Nationally circulated in outstanding trade journals and read by manufacturers, engineers, contractors, metallurgists, production control men—*these messages reach the men who specify and influence the purchasing of castings!*

R. Lavin & Sons, Inc.

RAILROAD DESIGNERS KNOW...

Bronze Journal Bearings Have Highest Fatigue Strength and Load Carrying Capacity

Performance of railroad journal bearings, under heavy load applications at relatively low speeds, can not be anticipated by the usual physical tests of tensile strength, elongation, etc. Since it is impossible to maintain a perfect oil film between the rotating journal and bearing, the behavior of bearing metals under momentary *metal-to-metal* contact becomes a major distinguishing characteristic.

With proper shaft alignment and reliable lubrication, bronze alloys are among the highest in fatigue strength and load carrying capacity.

Specify—LAVIN NON-FERROUS INGOT—*Quality*

R. LAVIN & SONS, INC.
Refiners of Brass, Bronze and Aluminum
3426 SOUTH KEDZIE AVENUE • CHICAGO 23, ILLINOIS
REPRESENTATIVES IN PRINCIPAL CITIES

The Foundryman's Problems . . . Are Our Problems!

REPRINTS OF ENTIRE *Brass Castings* SERIES ARE YOURS FOR THE ASKING

* Audited Circulation plus pass-on readership.

(*Continued from page* 148)

Lindgren, Wisconsin Steel Works; A. V. Magnuson, Champion Foundry & Machine Co.; T. J. Magnuson, J. S. McCormick Co.; S. E. McGinty, Firegan Sales Co.; N. L. Mooneyham, Velsicol Corp.; W. W. Moore, Burnside Steel Foundry Co.; B. A. Patch, Ohio Ferro-Alloys Corp.; O. E. Peterson, Foundry Supplies Co.; H. J. Pfeifer Jr., Electro Metallurgical Sales Corp.; L. D. Pridmore, International Molding Machine Co.; A. K. Sanderson, Love Bros. Inc.; H. J. Slichter, Beardsely & Piper Co.; E. W. Smith, Western Materials Co.; H. C. Swanson, Arrow Pattern & Foundry Co.; and H. K. Swanson, Swanson Pattern & Model Works.

Ontario

ONTARIO Chapter of the AFS held its annual picnic Aug. 21 at Barnesdale, the estate of Ralph Barnes, Wm. R. Barnes Co., Hamilton.

The morning was devoted to golf at the Dundas Golf Course, and the afternoon at Barnesdale was spent in contests such as darts, egg throwing, horseshoe pitching, shooting and other activities. Contest winners were John Wotherspoon, shooting; John Puchy and Bob Germond, egg throwing; Ralph Barnes and Ernie Snowden, horseshow pitching; R. Beckett, darts; N. Nesbitt, low net golf score, and H. W. Watson, low gross.

Door and other prizes were awarded immediately following the sumptuous buffet supper.

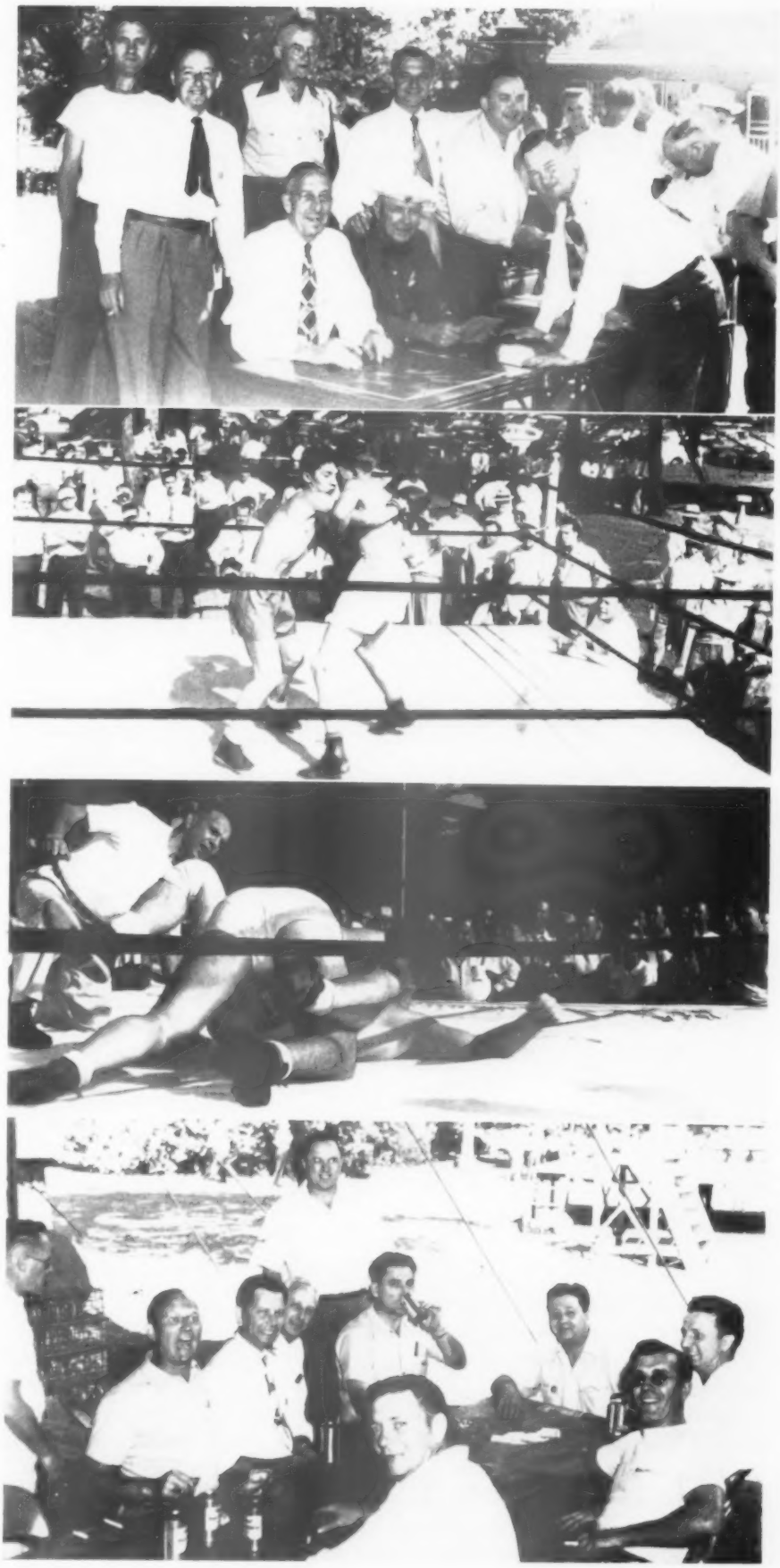
October meeting of the Ontario Chapter will be held at the Royal York Hotel, Oct. 29. The technical program will consist of group meetings with the following chairmen: Gray iron, Fred Jobson, Wm. Kennedy & Sons, Owen Sound; malleable, J. Barbeau, McKinnon Industries Ltd., St. Catherines; nonferrous, A. Boake, Non-Ferrous Castings Co., Toronto.—*Alvin E. Bock, A. E. Bock Foundry Co.*

Wisconsin

FIRST fall dinner meeting of the Wisconsin Chapter of the AFS was held Sept. 10, Hotel Schroeder, Milwaukee, with about 250 attending. Following the dinner interesting technical sessions on various foundry subjects were held in five parlors of the hotel.

Sectional meetings, subjects and speakers included the following: Gray Iron and Malleable (joint session), "Some Recent Production Experiences with Dielectric Core Baking," by J. P. Moran, Induction Heat-

(*Continued on page* 154)



CHICAGO Chapter of the AFS held its annual outing Aug. 14 at Lincolnshire Country Club. Views of the outing are shown above and were furnished by Harry E. Cullen, Carnegie-Illinois Steel Corp.

Eyes that put a hurry tag on a **450**-lb.

The job was RUSH! Routine inspection of the pilot casting called for visual inspection . . . physical test . . . sectioning of the stressed areas. A 10-day job.

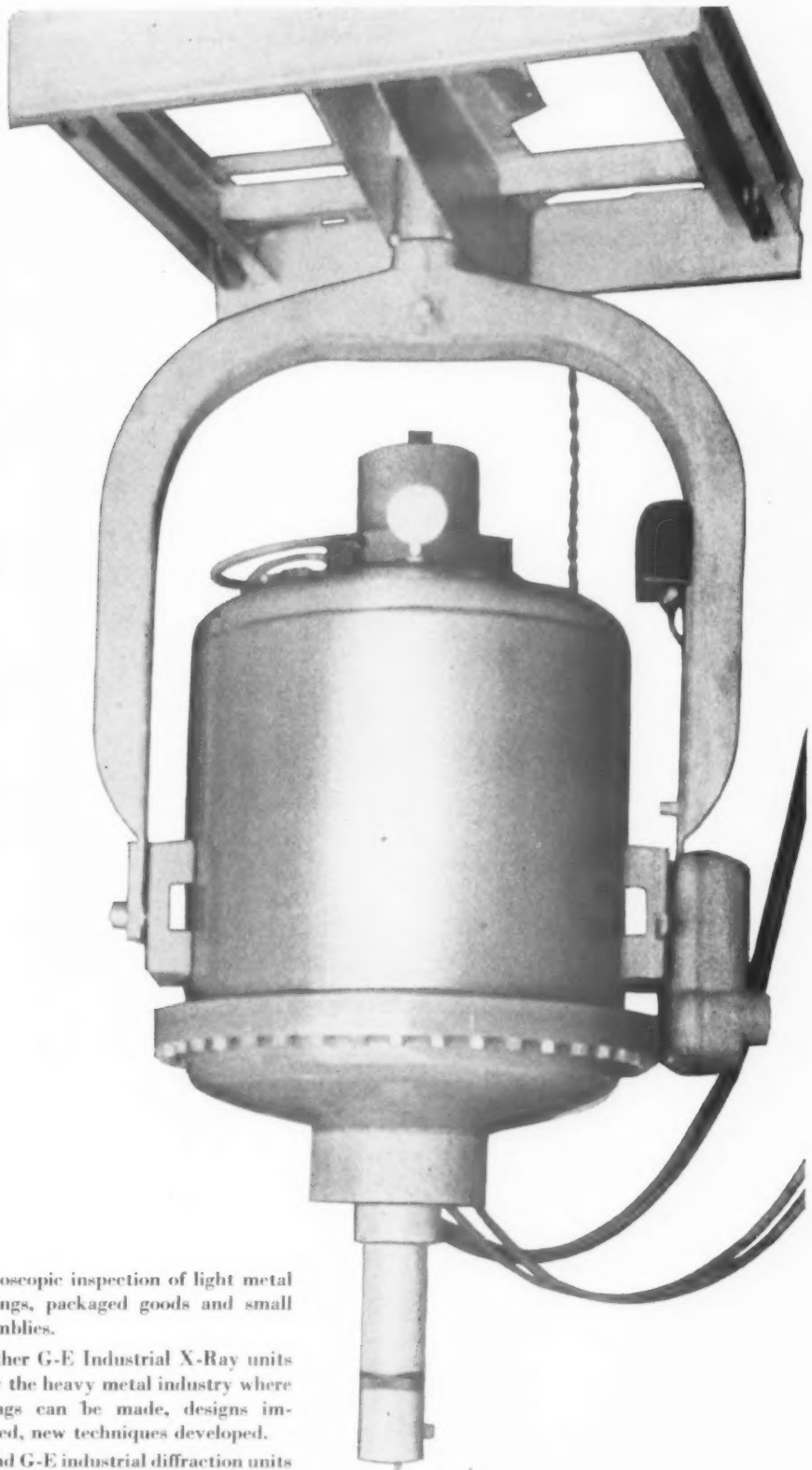
What was worse, a serious defect could mean starting again from scratch.

Here is how General Electric Industrial X-Ray equipment in the plant saved the day—8 days, in fact. The casting was poured, heads and gates burned off, some rough chipping done. The 450-lb. casting was rushed to the set-up room and x-rayed. Time—3 hours 50 minutes.

Management studied the films. Flaws were spotted, but so were ways to eliminate them. Minor changes were made in casting technique. Production started within 48 hours! Acceptably flaw-free castings were delivered *on time*. The customer was well pleased; company prestige increased. Once again, General Electric Industrial X-Ray had helped speed production, curb waste—and paid for itself in the first few jobs it tackled.

In scores of foundries and factories, General Electric Industrial X-Ray has become an important *developmental* tool. It not only diagnoses, but suggests a treatment. G-E Industrial X-Ray engineers stand ready to help fit industrial x-ray to your production needs. They'll be glad to talk to you about it. Write or wire. General Electric X-Ray Corporation, Dept. J-37, 4855 McGeoch Ave., Milwaukee 14, Wisc.

casting



Pioneers in the application of x-ray to industry, General Electric Industrial X-Ray engineers have devoted more than 20 years to the development and construction of industrial x-ray equipment—have the practical knowledge that comes only through experience.

Their research has resulted in a complete line of industrial x-ray units, each designed to do a specific job.

There are G-E conveyor units for fluoroscopic inspection of light metal castings, packaged goods and small assemblies.

Other G-E Industrial X-Ray units show the heavy metal industry where savings can be made, designs improved, new techniques developed.

And G-E industrial diffraction units provide quick solutions to a variety of problems involving behavior characteristics of materials, chemical composition and quantitative analysis.

GENERAL ELECTRIC X-RAY CORPORATION

General Electric X-Ray Corporation manufactures and distributes x-ray apparatus for industrial, dental and medical use; electromedical apparatus; x-ray and electromedical supplies and accessories.

(*Continued from page* 151)

ing Corp.; Steel, "Experiences with Oxygen in Melting Acid Electric Steel," by C. H. Wyman, Burnside Steel Foundry Co.; Nonferrous, "Can You Top This?" (an informal discussion on brain storms that proved to be boners), with L. Jessup, Federated Metals Division, C. Koepner, Duquesne Smelting Co., and R. Beam, Dixon Crucible Co., as speakers; Pattern, "Gating Patterns for Steel Castings," by V. E. Ziemer, Maynard Electric Steel Casting Co.; Technical, "Geology of Foundry Sands," by Fred C. Bond, Allis Chalmers Mfg. Co.

FOUNDRY EXHIBIT: Wisconsin Chapter of the AFS played an important part in the industrial exposition held near Milwaukee during Wisconsin's centennial celebration. More than one and a half million persons are estimated to have seen the chapter's exhibit, portions of which are shown here. Hand methods of making molds and cores were demonstrated along with modern core blowers and molding machines, to show progress in foundry practice. Bottom view at the exhibit includes, left to right: George E. Tisdale, Zenith Foundry Co., West Allis, Wis.; James J. Ewens, Grede Foundries Inc., Milwaukee; R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., chapter exhibit committee members

This was the first meeting under the direction of the new officers for the 1948-49 season. President Woodward introduced several new members, added since the last spring meeting of the chapter. George Tisdale, Zenith Foundry Co., who had been acting as treasurer of the group since the death of Robert Jordan last spring, was chosen as treasurer by the board. Chairmen and members of various committees have been chosen, the names to be announced shortly.

Wisconsin Chapter sponsored one of the industrial exhibits at the recent exposition held during the Wisconsin centennial celebration. The three-week exposition at the enlarged fair grounds near Milwaukee is estimated to have drawn 1,750,000 visitors, a large majority of whom viewed the chapter's extensive exhibit.

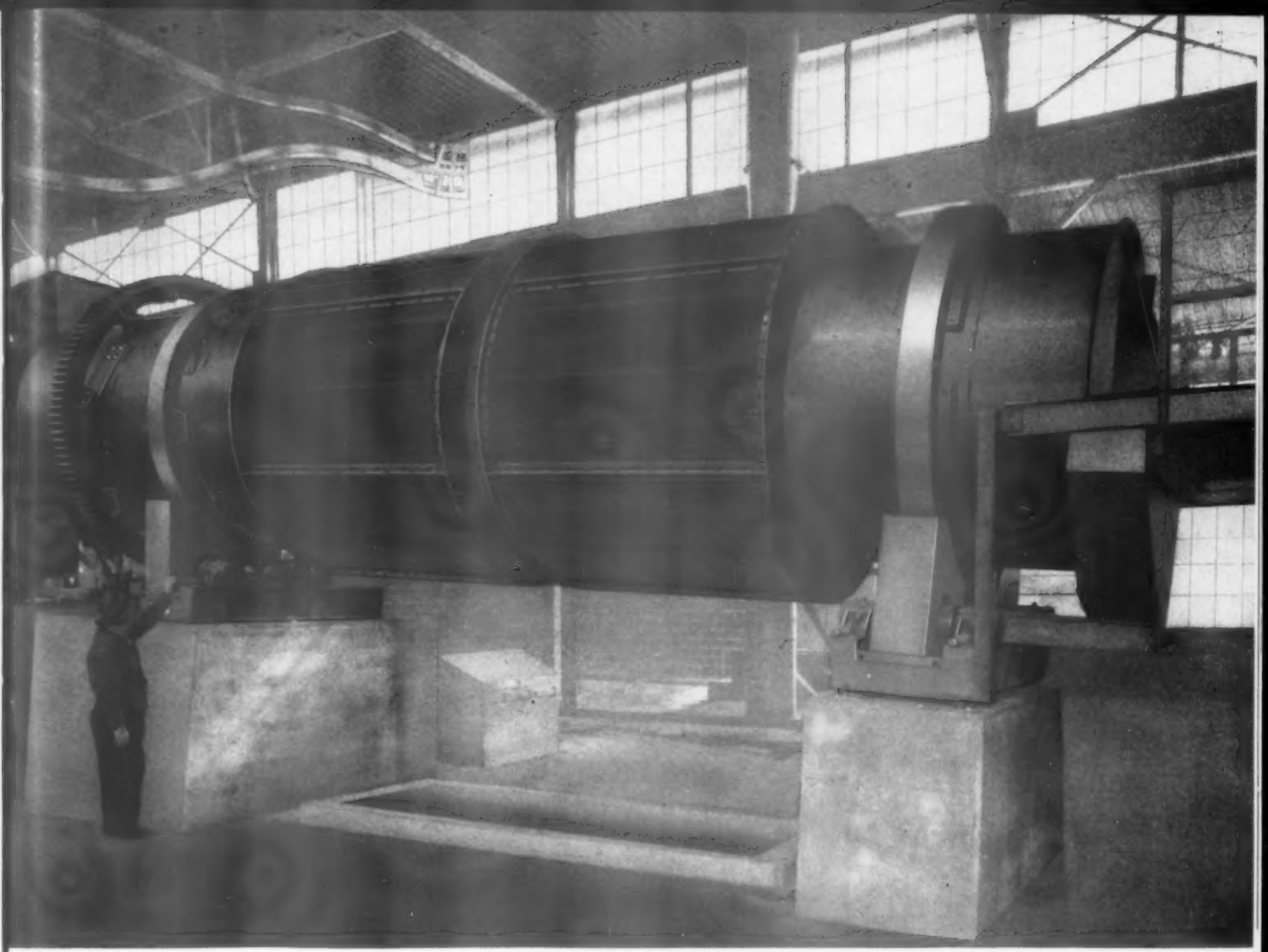
Background of the chapter's exhibit consisted of eight large murals showing various operations in representative foundries throughout Wisconsin. Actual foundry operations were demonstrated, both the old and modern methods being shown to afford a measure of the industry's progress in reducing manual effort. In addition, castings 100 years old were displayed along with modern types. Many visitors inquired about foundry work, and the improvements in practice and operating conditions were explained by attendants.—*John E. Hubel.*

Northeastern Ohio

OPENING meeting of the 1948-49 season for Northeastern Ohio Chapter of the AFS, held Sept. 9 at the Cleveland Club, brought out 235 members and guests for a clambake dinner and the subsequent technical sessions. The meeting was presided over by Chapter President Walter E. Sicha, Aluminum Co. of America, who recently succeeded to that office when Elmer C. Zirzow joined Deere & Co., Moline, Ill. William G. Gude, THE FOUNDRY, has been named to succeed Mr. Sicha as chapter vice president.

At the separate technical sessions of the foundry and patternmaking groups, the former was addressed by L. P. Robinson, Werner G. Smith Co., Cleveland, on the subject "Cutting Costs in the Coreroom." Mr. Robinson pointed out that it is possible to

(*Continued on page* 157)



It cools and screens hot shakeout sand

THE Bartlett-Snow Rotary Sand Cooling Screen pictured above (with dust hood and collecting hopper removed) handles about 135 tons per hour of hot shakeout and returned spill sand, in a large grey iron production foundry, reducing sand temperatures 25° to 50°F. preliminary to storing and mulling. The shell is 72″ in dia. by 28′ long, trunnion mounted, double jacketed and girt gear driven.

Incoming sand passing into the 10 foot breaker section is raised and dropped by lifting flights, breaking up the core lumps so effectively that little waste sand passes through to the tote box.

The fines pass through two double jacketed screening sections, each 6′ long, and discharge into a collecting hopper feeding to a belt conveyor. The dust hood is so mounted over the screen that air can be drawn in from the sides as well as through the ends of the screen, assuring dust-free operation and efficient cooling.

This screen is only one unit in a complex foundry completely engineered and installed by Bartlett-Snow . . . with molding, pouring, shakeout and cleaning operations synchronized so accurately that metal from the cupola is loaded into freight cars as inspected casting 1¼ hours after pouring.

Let the Bartlett-Snow foundry experts with their intimate familiarity with the needs of practical day after day foundry operation,—work with you on your next sand, mold, or castings handling problem. The C. O. Bartlett & Snow Company, 6200 Harvard Avenue, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

BARTLETT-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

SCOPE OF SERVICES IN BASIC FOUNDRY ENGINEERING

We are professional engineering consultants on matters pertaining to the physical activities and mechanical processes in the manufacture of castings with a background of more than twenty years in this work.

We are designers of new plants and of the necessary facilities to modernize existing plants.

We have advanced some of the newest designs in foundry equipment and will steadily improve these techniques.

We supply complete construction and detailed drawings of equipment, structures, electrical systems, etc., with full specifications and material schedules.

We have no associations which could be prejudicial to ethical conduct of all engineering phases of any project. This assures an undivided responsibility to our clients and the best results at the least capital outlay.

A preliminary conference on the question of initiating improvements or new projects incurs no obligation.

FRANK D. CAMPBELL

Consulting Engineers

SERVING THE FOUNDRY INDUSTRY

332 SOUTH MICHIGAN AVE. WABASH 3479 CHICAGO 4, ILLINOIS

(*Continued from page* 154)
make a core with any kind of sand, but not necessarily a good core, consequently selection of the correct sand grade is a primary consideration. The wrong sand can mean excessive use of binder, as evidenced by one foundry which saved about $8000 a year in the coreroom by changing from a cheap bank sand to a relatively expensive clay-free sand.

Lack of intelligent help in preparing core sand mixtures and use of poor measuring devices also can prove costly. Other sources of waste are excessive use of cereal binders and failure to adopt the correct mixing time in preparing core sand. The speaker indicated that inefficient baking operations cause more trouble than other factors, difficulties arising either from baking at the wrong temperature or use of ovens having poor heat distribution, or both.

Carl Winkler, Cleveland Standard Pattern Works, Cleveland, was chairman and discussion leader for the patternmakers' session, which included three talks. Al Fath Jr., P M S Co., Cleveland, described various patternmaking equipment and supplies, including matchplates, a special cutting tool and a new cold water-proof glue. E. T. Kindt, Kindt-Collins Co., Cleveland, gave a brief demonstration on how to apply coatings to wood patterns. The main part of his talk was devoted to a discussion of pattern lumber. Pine wood suitable for patterns is scarce and the supply is not likely to improve, he said. Mr. Kindt showed samples of South American woods which have been experimented with to determine their suitability as pattern stock. Cost of these woods was stated to be close to that of domestic lumber, in some cases lower.

Concluding presentation was a description by Norman Maples, Wellman Products Co., Cleveland, of the

SOUTHERN CALIFORNIA: At the June 11 meeting of Southern California Chapter of the AFS, retiring president Hal Russill, Eld Metal Co., is shown in upper left presenting the gavel to Leonard Hofstetter, Brumley-Donaldson Co., president elect. At upper right, left to right, are: Jack Folsom, Brumley-Donaldson Co.; O. J. Stoudt, West Coast Foundry Equipment Co.; Al Goodreau, G. B. Brass & Aluminum Foundry Inc.; Ray Ortgies, Whiting Corp.; G. G. Nass, West Coast Foundry Equipment Co. and Ott Rosentretter, National Engineering Co., Pacific Coast Division. Proudly displaying the bowling trophy in view at lower left are winners of the chapter bowling league. Back row, left to right, are: Stubb Davenport, O. Walling and W. Klick. Front row: Doug Faust and C. Faust. All are from Allied Castings Co. Lower right, left to right, are: A. H. Tatro, A. H. Tatro Supply Co; Edwin K. Smith, consulting metallurgist; Anpea Pasquale, Renfrow Foundry; Pop Wilson, Owl Foundry; Griff R. Jones, Snyder Foundry Supply Co.; John E. Hyatt, Grant & Co. and Gene C. Lang and H. G. Pagenopp, Angelus Pattern Co.

company's corebox machine and a demonstration of its operation by its inventor, O. L. Miller.

Non-Ferrous Society To Meet Oct. 21-22

Annual meeting of the Non-Ferrous Founders' Society will be held at the Warwick Hotel, Philadelphia, Thursday and Friday, Oct. 21-22. On Thursday afternoon there will be opportunity for informal discussion and plant visitations. The formal business meeting will open at 10 a. m. Friday, when reports of officers and committee chairmen will be given. Elections of new directors will be certified, and the president will present the future program activities for open discussions.

At the noon luncheon meeting an executive of the National Security Resources Board, Washington, will discuss the nonferrous founders' obligations and opportunities in the present preparedness program. Time will be allotted for questions and answers. The afternoon session will be closed for membership only for discussion and decision on both cooperative manufacture and purchase of base nonferrous metals, especially aluminum.

Annual dinner for members, wives and guests will be at 7 p. m. with a reception and cocktail hour preceding. The committee has planned some exceptional entertainment. New officers will be presented at the dinner. There will also be a final meeting of the 1947-48 board of directors on Thursday and an organizational meeting of the 1948-49 board of directors on Saturday morning, Oct. 23.

Form Gray Iron Management Groups

Additional management groups in the expanding Gray Iron Founders' Society district organization recently have been formed.

In the Chicago area group, Edward B. Sherwin, Chicago Hardware Foundry Co., Chicago, has been elected chairman; R. H. Lehmpuhl, Sheffield Foundry Co., Chicago, vice chairman, and Robert F. Grover, Love Brothers Inc., Aurora, Ill., secretary-treasurer.

The Alabama group has elected E. Armand Thomas, Thomas Foundries Inc., Birmingham, temporary chairman until a permanent organization is set up.

At an organizational meeting in Atlanta, management executives of Georgia and Florida established a Southeastern group. James W. Simmons Jr., Cox Foundry & Machine Co., Atlanta, was elected chairman; Olan Richardson, Southern States Equipment Co., Hampton, Ga., vice chairman, and Malcolm W. Baldwin, Spalding Foundry Co., Atlanta, secretary-treasurer.

The Southern group, covering Texas and Arkansas, named Charles R. McGrail, Texaloy Foundry Co., San Antonio, Tex., chairman. The permanent organization will be set up later.

Ormond C. Corry, Harrison-Corry Co., Knoxville, Tenn., was made chairman of the Tennessee group which includes Chattanooga and Knoxville.

For the Indianapolis group, Harry D. Caylor, C. & G. Potts & Co., Indianapolis, is chairman; Charles H. Cochran, Crawfordsville Foundry Co., Crawfordsville, Ind., is vice chairman and Leo R. Meyer, Interstate Foundry Co., Indianapolis, is secretary-treasurer.

At a meeting in Syracuse, foundry representatives from eastern New York elected Wallace E. Thomas, Straight Line Foundry & Machine Corp., Syracuse, chairman; William O. Smith, Oneida Foundries Inc., Oneida, N. Y., vice chairman, and J. H. Weekes, Straight Line Foundry & Machine Corp., secretary-treasurer.

R. L. Collier, executive vice president of the society, addressed some of the new groups on the society's activities and plans.

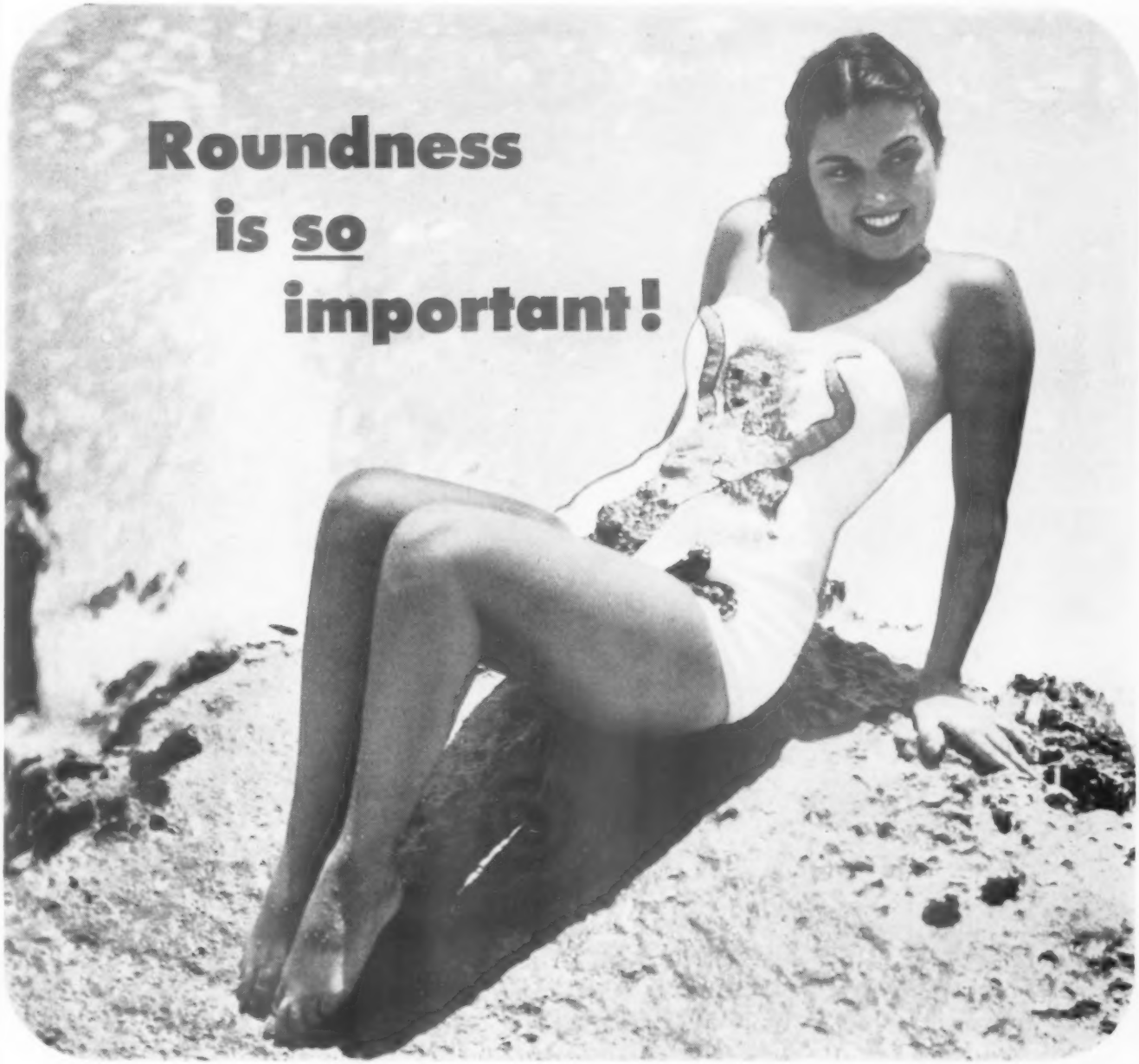
NORTHEASTERN OHIO: Scenes at the annual outing of Northeastern Ohio Chapter, AFS, held June 25 at Pine Ridge Country Club, Cleveland. Photos courtesy Sterling Farmer, Sand Products Corp.

New England Group Plans Conference

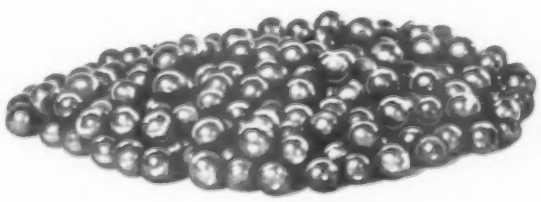
Annual New England Foundry Conference, sponsored by the New England Foundrymen's Association, is scheduled for Friday and Saturday, Oct. 22-23 at the Massachusetts Institute of Technology, Cambridge, Mass. This will be the third such conference, following a wartime lapse of four years, although during the last two years the meetings were held in March.

As in the past, MIT and various New England foundry societies are co-operating with the New England Foundrymen's Association in sponsorship of the event. An interesting program of technical talks is being prepared and will cover a variety of topics, including cupola practice, sand control, casting design, etc.

Officers of the New England Foundrymen's Association are: President, Arthur F. Dockry, H & B American Machine Co., Pawtucket, R. I.; vice president, Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; secretary, Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.; treasurer, Arthur W. Gibby, East Boston, Mass.



Forgive us for using glamour (Miss Jean Cambron, one of Cleveland's loveliest) for the very obvious reason of getting you to read our advertisement. But you see, it's so necessary that you learn about ANNEALSHOT. Foundrymen have always taken shot and grit pretty much for granted. Now there's a new kind of shot—a much better shot—and you should know about it.



ANNEALSHOT is more uniformly round and completely free of foreign material. So right off, you know it will produce a more uniformly beautiful finish, with less wear on your equipment. It's annealed by a special process developed by METAL BLAST, which toughens and hardens the shot—but doesn't make it brittle. You'll get 15% longer life from ANNEALSHOT, more efficient cleaning and peening, a better finish in less time—yet it costs no more than ordinary shot. Worth a trial, don't you think? While it's fresh on your mind—why not send an order today, to METAL BLAST, INC., 872 East 67th Street, Cleveland 3, Ohio.

ANNEALSHOT by Metal Blast®

Trade Mark Reg. U. S. Pat. Off.

FREEMAN *Dowmetal* PATTERN PLATES

All Plates Shipped Same Day Order is Received

TRY THEM FOR COPE AND DRAG MOUNTINGS

Many foundries are already using FREEMAN PATTERN PLATES as they are LIGHTER, STRONGER and IMMEDIATELY AVAILABLE in ANY SIZE AND QUANTITY. Surfaces are held to CLOSE PARALLEL TOLERANCES and plates are of UNIFORM THICKNESS.

With their clean VELVET FINISH, plates are received in proper condition for mounting patterns. Drilling, tapping and NECESSARY MACHINING to mount patterns is DONE MORE EASILY on free-cutting DOWMETAL PATTERN PLATES.

For regular pattern or cope and drag work, we can furnish ANY PRACTICAL SIZE 5/16"—3/8"—1/2"—5/8"—3/4"—1" THICKNESS. When ordered by flask size, we allow 1" for flask and 2-1/2" on each end for pins and ears. If square or rectangular plates are desired, specify overall size and thickness. For special shapes send a template or sketch. LITERATURE AND PRICE LIST AVAILABLE.

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment

Mahogany and Pine Pattern Lumber

1152 E. BROADWAY TOLEDO 5, OHIO

Purdue Casting Conference Program Announced

A COMPREHENSIVE technical program has been announced for the Metals Casting Conference to be held at Purdue University, West Lafayette, Ind., Thursday and Friday, Nov. 4-5. Approximately 15 papers and round-table discussions will be presented during the two-day conference, which will be held at the Memorial Union building on the Purdue campus.

Central Indiana and Michigan chapters of the American Foundrymen's Society are co-operating with the uni-

C. T. MAREK

versity in sponsorship of the event. C. T. Marek, assistant professor of engineering shop practice at Purdue, is chairman of the committee in charge of conference arrangements. Other committee members are: H. A. Bolz, head, department of general engineering; G. M. Enos, professor of metallurgical engineering; Paul H. Harlan, vice president, Electric Steel Castings Co., Indianapolis; F. T. McGuire, foundry manager, Sibley Machine & Foundry Corp., South Bend, Ind.; M. M. McClure, Purdue technical extension division, and R. W. Lindley, chairman, Purdue engineering shops.

In addition to the technical sessions scheduled for the two days, a banquet will be held Thursday evening with Dr. Frank Sparks, president, Wabash College, the principal speaker. Dr. Sparks, who is a combination of successful industrialist and college president, will discuss how industry and education can best work together for mutual advantage; he will also comment on industrial and educational conditions in Europe as he observed them on a recent visit.

The detailed program follows:

Thursday, Nov. 4

Registration, Purdue Memorial Union...9 a.m.

Welcome Address .....10:30 a.m.
Presiding—Prof. H. A. Bolz, Head, Dept. of Gen. Engineering. Speaker—Dr. A. A. Potter, Dean of Engineering.

Quality Control .....11 a.m.
Presiding—Dallas F. Lunsford, chief metallurgist, Perfect Circle Corp., New Castle, Ind. "Quality Control for the Practical Foundryman"—Dr. I. W. Burr, industrial consultant, associate professor of mathematics, Purdue.

Lunch .....12:15 p.m.

Foundry Mechanization .....1:30 p.m.
Presiding—Beauford E. Gavin, assistant manager, National Malleable & Steel Castings Co., Indianapolis. "Better Labor Relations by Mechanization"—B. L. Simpson, president, National Engineering Co., Chicago. "New Foundry Horizons"—Motion picture showing modern casting production in a mechanized jobbing foundry; commentator—R. L. McIlvaine, vice president-sales manager, National Engineering Co., Chicago.

Foundry Personnel Problems.....3:15 p.m.
Presiding—Dr. R. W. Field, Assoc. professor of industrial engineering, Purdue. "Labor Procurement"—Joe H. Ayres, supervisor of employment and insurance, Armco Steel Corp., Middletown, O. "Labor Training"—James G. Purvis, supervisor of training, Armco Steel Corp., Middletown, O. "The Personal Element in Employee Relations"—Ralph L. Lee, department of public relations, General Motors Corp., Detroit.

Banquet, Purdue Memorial Union....6:30 p.m.
Presiding—Paul H. Harlan, vice president, Electric Steel Castings Co., Indianapolis. Introduction—Dr. Frederick L. Hovde, president, Purdue University.
"Relation between Industry and Education"—Dr. Frank Sparks, president, Wabash College.

Friday, Nov. 5

"Making Best Use of Raw Materials in Melting" .....10 a.m.
(Questions in written form will be welcomed by the speakers before the conference, also either before or during these two sessions.)
Ferrous Metal Division: Presiding—Dr. F. T. McGuire, foundry manager, Sibley Machine & Foundry Corp., South Bend, Ind.; principal speaker—R. G. McElwee, manager, Iron Foundry Division, Vanadium Corp. of America, Detroit. Supporting speakers: Gray Iron—R. H. Bancroft, plant manager, Perfect Circle Corp., New Castle, Ind.; Malleable Iron—William Ferrell, general works superintendent, Auto Specialties Mfg. Co., St. Joseph, Mich.; Steel—G. C. Dickey, works manager, Harrison Steel Castings Co., Attica, Ind.
Nonferrous Metal Division: Presiding—V. S. Spears, American Wheelabrator & Equipment Corp., Mishawaka, Ind.; principal speaker—Hiram Brown, chief metallurgist, Solar Aircraft Co., Des Moines, Iowa. Supporting speakers: Light Metals — A. T. Ruppe, foundry superintendent, Bendix Products Division, Bendix Aircraft Corp., South Bend, Ind.; Brass and Bronze — Robert Langsenkamp, secretary, Langsenkamp & Wheeler Brass Works Inc., Indianapolis.

Lunch .....12:15 p.m.

Casting Procurement .....1:30 p.m.
Presiding—Dr. G. M. Enos, professor of metallurgical engineering, Purdue. "The Purchaser Expects from the Foundry, What and Why?"—Ben G. Thiel, purchasing engineer, Waukesha Motor Co., Waukesha, Wis.

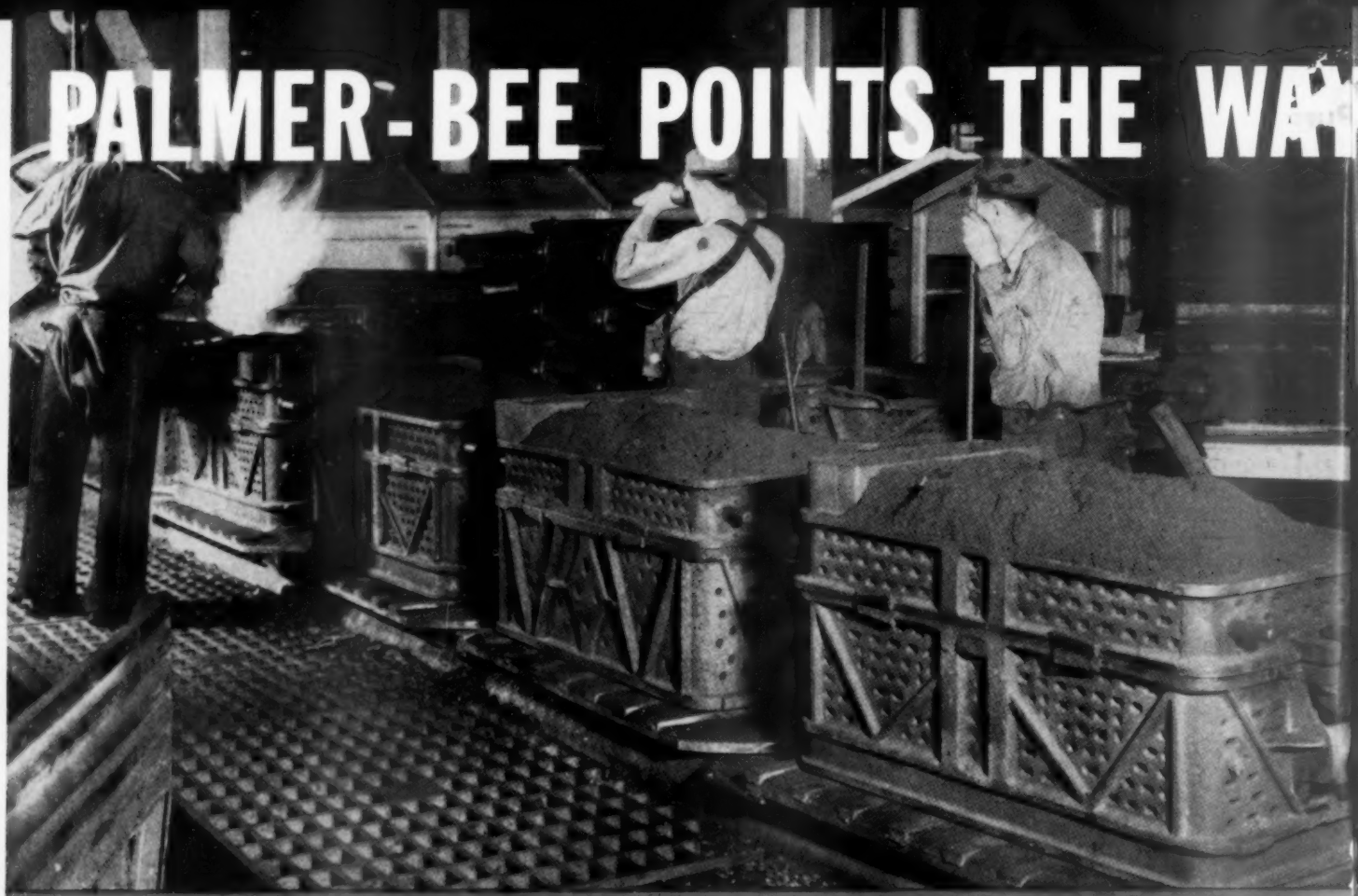
Tour through the university.....3 p.m.

Publishes Bulletin On Gray Iron

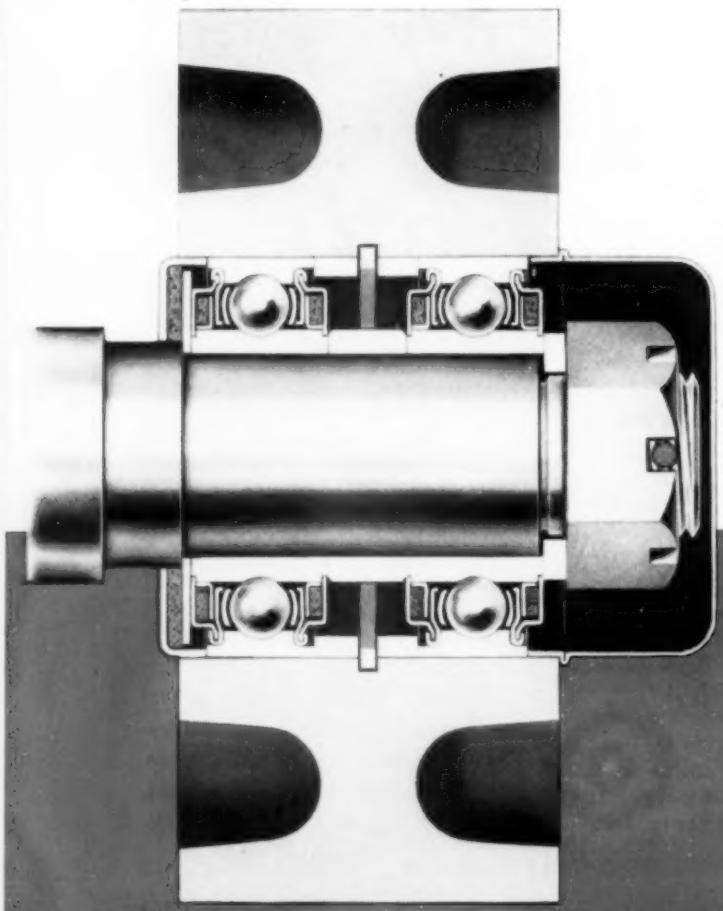
Gray Iron Founders' Society, 33 Public Square, Cleveland 13, has published a technical bulletin, "Gray Iron —Its Mechanical and Engineering Characteristics and Details for Designing Cast Components." The bulletin was prepared by Thomas E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa., and Mt. Vernon, O., and Charles O. Burgess, technical director of the society, and is intended to assist engineers in specifying and designing gray iron components or parts.

PITTSBURGH: Views of the annual June outing of Pittsburgh Foundrymen's Association are shown above. Photos are by courtesy of Alex Cadman, A. W. Cadman Mfg. Co., Pittsburgh

PALMER-BEE POINTS THE WA



TO GREATER FOUNDRY EFFICIENCY



MOLD CONVEYOR CAR WHEEL AND AXLE

● Illustrated above is a Palmer-Bee Heavy Duty Mold Conveyor passing through a pouring zone.

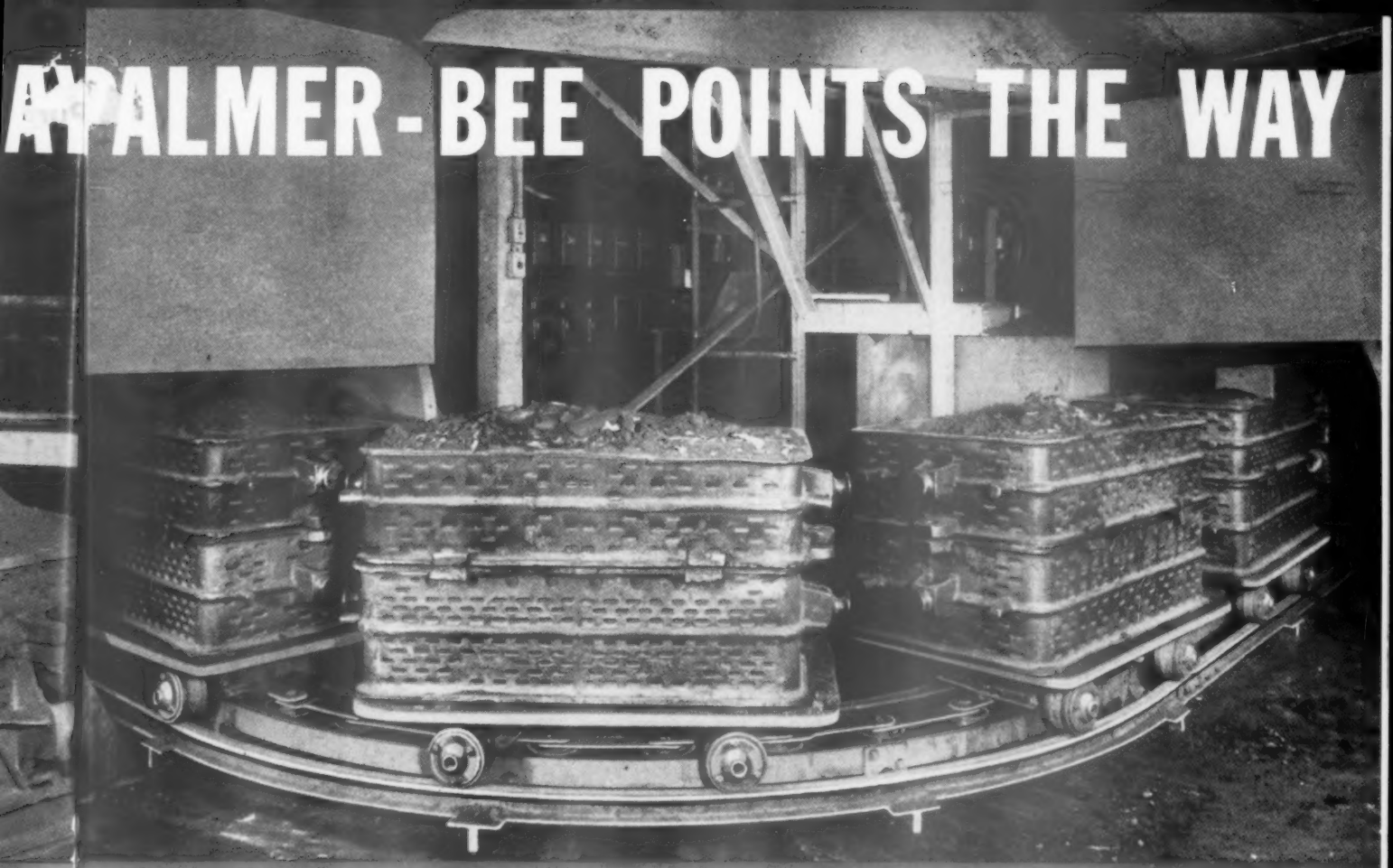
When making a horizontal turn, of which there can be many, the mold car axles automatically, and without guides of any kind, remain radial with the center point of the curve, thus permitting the car wheels to rotate independently and freely without chatter or sliding action. This feature, when necessary, makes possible small radius curves, and ultra smooth running through the core setting and metal pouring stations.

The sectional view opposite shows the mold car wheel assembly complete with "Lubricated for Life" bearings perfectly sealed and shielded from grit and dirt.

"LUBRICATED *for* LIFE"

PALMER-BEE CO.
CONVEYORS
POWER MACHINERY
DETROIT
SPEED REDUC
STEEL FABRICATORS
ENGINEERS

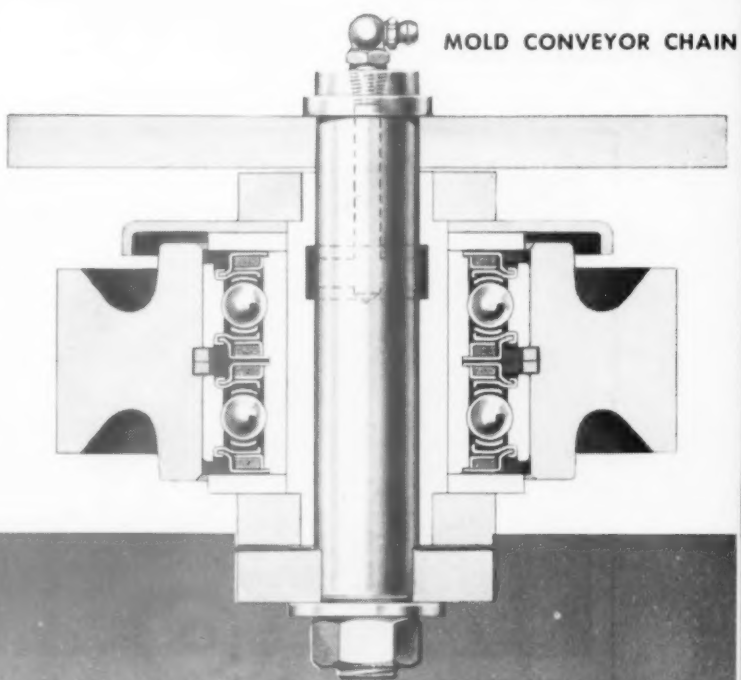
PALMER-BEE POINTS THE WAY



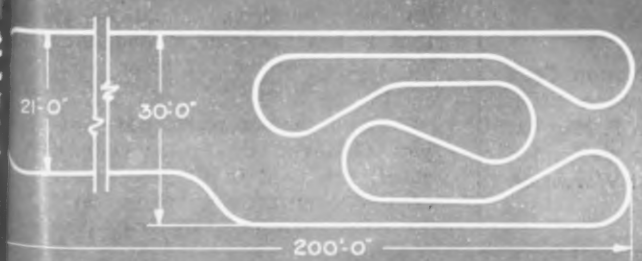
CYTHROUGH LIFETIME LUBRICATION

● How long is "Lubricated for Life"? We do not know. We do know that a Palmer-Bee mold conveyor equipped with "Lubricated for Life" bearings has been in operation ten years in one of the largest productive foundries in this country . . . for the most part two shifts . . . without a single bearing or wheel replacement. A lifetime of 20 years or more is indicated.

The view opposite shows the mold conveyor chain roller equipped with "Lubricated for Life" bearings. In order to conserve floor space some layouts require numerous short radius turns. The diagram below illustrates the point in an actual installation, and shows where the chain pull builds up rapidly making necessary either multiple drives or anti-friction chain rollers. It is here that "L for L" bearings again came to the rescue and made the curves feel like straight track.



ram of 620' Mold Conveyor Installation



LESS FLOOR SPACE—LESS HANDLING

PALMER-BEE COMPANY
Westminster at Grand Trunk Railroad
DETROIT 12, MICHIGAN

BRANCHES: CHICAGO • PITTSBURGH • MILWAUKEE
WINSTON-SALEM • NEW YORK, N. Y.

INCENTIVES IN THE NATIONAL ECONOMY

(*Continued from page 92*)

to secure from each employee his continuing best effort, a high degree of leadership and co-operation is essential, because increases in effort do not bring forth corresponding increases in pay. Such a plan, however, may well be preferred to a poorly-conceived or poorly-maintained incentive plan.

This brings us to our second category—incentives for the daily physical and mental efforts of employees toward high productivity. It is not esential to this discussion to go into all of the possible types of wage incentives. Wartime wage incentives ran the whole gamut. We had the opportunity in the War Production Board to study all types of plans and to ascertain their results. Reports on the operation of new wage incentive plans indicated that on the average an increase in productivity of about 40 per cent occurred in the first ninety days of operation. Wages increased an average of 15 to 20 per cent and costs decreased 10 to 15 per cent. Most industrial engineers will realize that these are very conservative figures for well-engineered installations.

Such figures indicate that no company which expects to be competitive should fail to consider wage incentives. Nevertheless they are not panaceas and are not self-operating devices. Too often they have been and are established merely with the object in view of increasing profits, regardless of their inherent justice. Too seldom are they considered as the means of establishing the fairest method of compensating employees for well-done jobs in proportion to their efforts. We should keep our thinking away from covetous grasping for results which, in the natural course of things, are bound to follow provided we aim for a well balanced plan, which of itself will bring out the greatest acceptance on the part of labor and supervision.

During the war, the WPB issued 16 basic guiding principles for wage incentive plans. I shall now briefly summarize a revision of these principles which seem suited for postwar practice.

1. *Basic Wage Foundation*—There should be a sound competitive guaranteed hourly rate structure, based upon an evaluation of the skill, responsibility and working conditions inherent in the various jobs. If, on the same job it is desired that employees should have varying individual rates, then such measurable factors as productivity, quality, length of service, regularity of attendance and versatility should be used.

2. *Simplicity*—The plan should be as simple as is practicable, without inequities. Workers should be able to understand the effects of their efforts on their earnings.

3. *Quality Control*—The desirable and economic degree of quality should be determined and maintained.

4. *Establishment and Control of Standards*—To secure lowest costs and to prevent uneven standards and inequitable earnings, the use of an incentive plan should be preceded by basic engineering improvements in design, equipment, methods, scheduling and material handling.

Then, through the use of detailed time study procedure, elemental standards should be established by management for each unit of an operation. They should represent the amount of work performed by a normal qualified operator under normal conditions.

Once set, except to properly correspond to changed conditions, these elemental time standards should not be altered unless by agreement between management and labor.

However, it is essential to progress that constant thought should be given to improvements in methods, matarials, equipment or other controlling conditions. In every such case, time standards should be brought exactly in line with the new conditions.

5. *Units of Application*—Standards applied to individuals or to small integrated groups are most effective. At times, due to difficulties in recording production, and due to the possibilities of teamwork, group standards may be advisable.

6. *Broad Coverage*—It is desirable that the incentive plan cover as many employees as possible. The efforts of indirect workers and clerical workers are often as readily measured as those of direct workers. Where this seems difficult, they may sometimes be tied in on a ratio basis with the direct workers whom they serve.

7. *The Production-Incentive Relationship*—With well-engineered standards it is best to use an incentive plan in which earnings in excess of standard are in direct proportion to the increased production.

8. *Understanding of Human Relations*—A wage incentive plan may be either a constructive force for increased production, better quality and good labor relations or it may be the means of disrupting an organization. Management should be prepared to direct its best thoughts to its installation and maintenance. Management, while necessarily retaining its own functions, should be sure that it has the general understanding and agreement of labor regarding the program.

Wage incentive plans, designed to pay additional wages for additional effort, are used in perhaps one-half of the manufacturing plants in the

(*Continued on page 166*)

NEW PLANT: The ten millionth grinding wheel made by Norton Co.'s new manufacturing process is presented by George N. Jeppson (left), chairman of the board and envisioner of the process, to Milton P. Higgins, president. The presentation took place Aug. 30 during the dedication ceremony of the new $4,300,000 plant built by Norton Co. at Worcester, Mass., to house the new process

This Foundry Is A Good Place to Work

URICK FOUNDRY CO.

MEMBER

This Pennsylvania jobbing foundry, producing a broad, general range of grey iron castings from 25 lbs., to 250 lbs. is another good place to work. Its modernization and mechanization program goes on constantly — to assure quality work, maximum production and peak efficiency at all times.

A safety committee meets regularly, to discuss and recommend means of increasing worker safety. Lighting, ventilation, and general housekeeping receive close attention from all management and supervisory personnel.

The 750 lb. machine illustrated is one of Herman's complete line of lighter capacity machines. Like all Herman machines, they are contributing to outstanding foundry production everywhere. Rugged construction, precision machine work, and careful engineering guarantee high production runs with the Herman.

Features include automatic timer; one rotary valve handle controls jarring, roll-over, pattern draw, vibrator, equalizer lock, etc. More details gladly supplied from the address below. Wire, call, or write today.

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page* 164)

country. The installation of such plans has increased productivity and decreased labor cost from the day-work level to the incentive level. To remain at this point would be stagnation. We should be continually increasing productivity and decreasing labor cost by the application of ideas —by changing standards as the result of technological improvement.

Many companies, when standards are established and incentives for effort are applied, lie back on the oars feeling that they have arrived at the "one best way". Someone, however, should immediately be given the job of finding the "better way of tomorrow." Someone should be given the job of keeping and submitting a periodic record of the net reductions or increases in labor cost due to changes in standards. Such a record is the barometer of a company as to technological progress insofar as the element of labor is concerned.

The progress will be great or small, largely according to the degree of enthusiasm and co-ordination for it on the part of everybody involved.

In order to attain these results, management needs to do two things:

1. It should bring to a minimum the possibility of those negative results which have been associated with technological improvements and which workers have learned to fear.

a. The greatest of care should be taken so that method changes do not result in loss of employment.

b. Transferring to other jobs should

(*Continued on page* 168)

Ingot Group Promotes Use of Cast Products

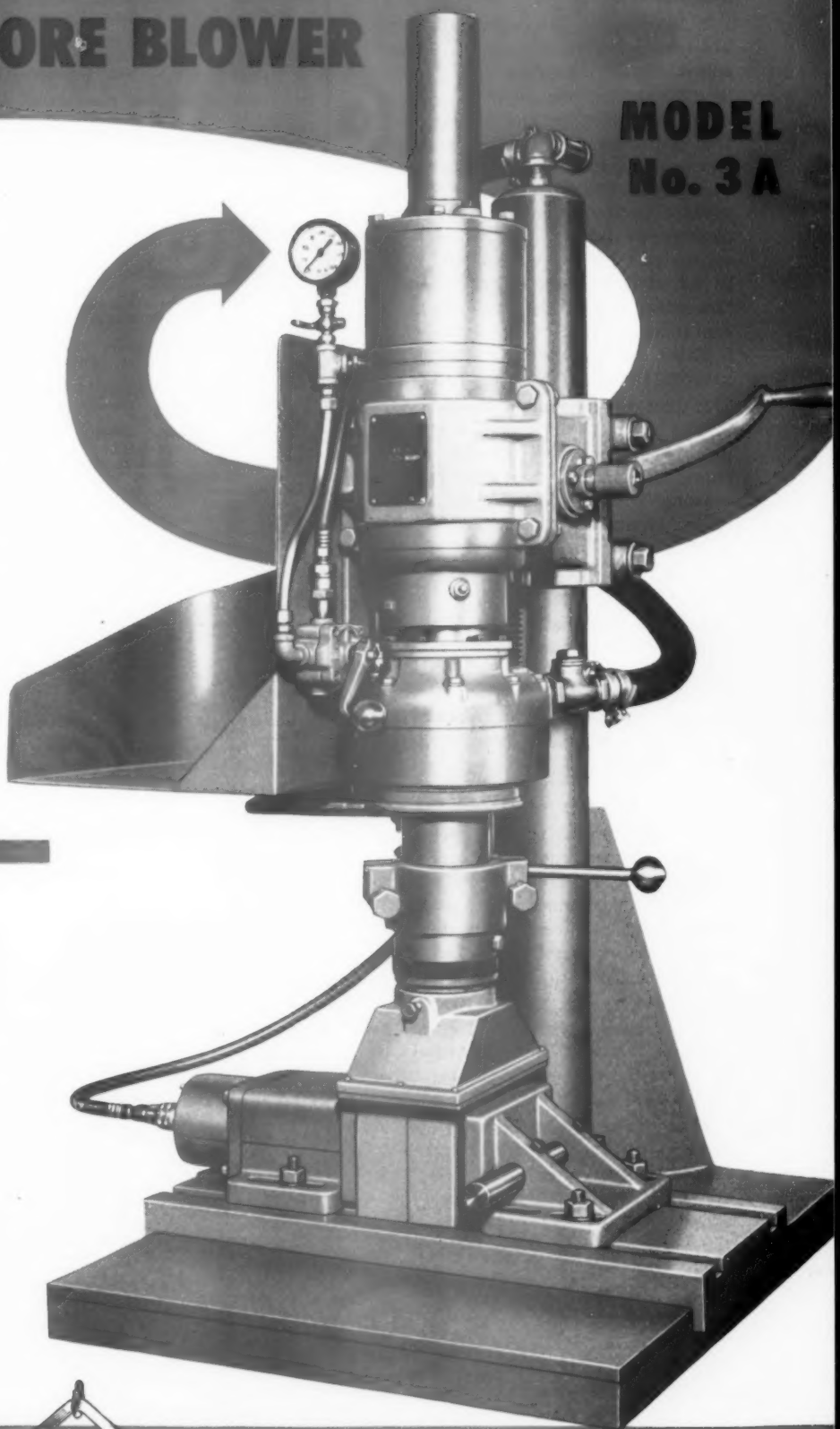
IN AN organized co-operative effort to foster wider use of nonferrous metals in castings, the Brass and Bronze Ingot Institute, 308 West Washington St., Chicago, has inaugurated a campaign in the design engineering and industrial press. Composed of 14 nonferrous metal suppliers whose membership fees support the advertising program, the institute recently changed its name from the Nonferrous Ingot Metal Institute to the present one, which more explicitly identifies its sponsors and objectives.

A feature of the advertising program—which stresses dramatic highlighting of the more extensive uses of brass and bronze in the form of cast products—is the availability of reprints to the foundries in whose interest, basically, the program was initiated. Quantities of each reprint are sent to foundries as requested. On the 4-page reprint a blank page is afforded recipient foundries on which they may use their own direct message to customers, thus taking specific advantage of the advertising being circulated on their general behalf. The accompanying illustration shows typical examples of two-color insertions.

Executive direction of the campaign is being handled by I. Glueck, secretary of the institute.

30% MORE BLOW PRESSURE with MILWAUKEE-TACCONE *Explosion Type* CORE BLOWER

MODEL No. 3A



The Milwaukee-Taccone Model No. 3A Core Blower provides 30% more blowing pressure to produce intricate cores up to 4 lbs. in size. This bench style blower maintains a high and steady pressure throughout the fast 2½ second blowing cycle to assure quality core production at all times. A precision gauge gives constant check on the blowing pressure and a neoprene bonded plate on the blowhead guarantees a tight seal around the blow holes to protect against wear and loss of air pressure. The increased, constant pressure assures the blowing of hard standing cores from sand with or without green strength. The blowing of cores is instantaneous, with an EXPLOSION-like action when the quick opening valve is released. This single hand operated valve operates both vertical and horizontal core box clamps, blows core and releases clamps in proper sequence.

NEW HEAVY-DUTY CORE BLOWER
Steps Up Blow Pressure 100%

The New Milwaukee-Taccone Model No. 4A Bench Style Core Blower was developed to meet the needs of foundries producing high quality cores up to 12 lbs. and requiring quick adjustments for short run jobs. Its compression cylinder boosts the blow pressure 100%, making possible the effective blowing of cores at 180 lbs. pressure when the line pressure is 90 lbs. This core blower is ideal for blowing green sand cores. It is designed and built to withstand the continuous hard usage of fast production foundries. For complete facts, write for literature.

***New* EASY CREDIT TERMS!**

All Milwaukee Foundry Equipment may now be purchased on convenient credit terms. Write for complete details.

MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

(*Continued from page* 163)
be done with wisdom.

c. Proper thought should be given to the training and assisting of workers in accommodating themselves to new conditions.

2. Reasonable managements have always taken such steps. However, something of a more positive nature is necessary if we hope to have individual employees and unions desire the improvement of methods with the corresponding rectification of standards. That "something" is the prompt participation by labor in the savings in labor costs which it is estimated by management will actually be attained. We may call it an "incentive for ideas" for their acceptance and their initiation.

There are two reasons why management should adopt this policy:

1. Just as consumers should share in the progress of industry through price reduction and owners should share through the security of their reasonable dividends, so it is also quite logical and reasonable that labor should share in the progress of industry in some relation to the degree of that progress.

2. It is far better that the real need of this participation be recognized and worked out scientifically by management than that it come through pressure in a manner that would tend to upset our entire economic system.

No Benefit To Workers

All too often technological improvements and method changes are accompanied by no immediate benefits to the workers, or else by quickly worked out methods of appeasement which distort completely the basic wage structure.

Labor may participate in savings in labor cost in two ways, either by changes in current hourly earnings or by distribution of lump sums or bonuses.

1. If hourly earnings are to be changed it will be accomplished in one of two ways, either by alteration of base rates or of incentive standards.

a. To raise the base rates of all employees equitably upon the inauguration of method changes may not be unreasonable in theory but it is entirely impracticable because of the large number of changes of varying amounts which we should expect. To raise the base rates of certain effected employees only, would immediately throw out of line for the future the whole base rate structure which should continually remain in balance and reflect the corresponding skill, responsibility and working conditions.

b. To cause the participation in savings to be accomplished by allowing incentive standards to get out of line and no longer be the real measure of effort, is indeed bad practice. Unfortunately, this is the method into which management most often drifts. Far more often than management itself realizes, methods are changed by engineers, by supervisors, or by workers themselves with no corresponding changes in standards. These changes may be neglected because:

1. No one thinks of reporting the change.

2. They are felt to be too trivial, each by itself.

3. The expense or trouble of the adjustment seems too great.

4. Management fears objections.

5. There is actual resistance on the part of w orkers or union. Often, compromised standards are the result of negotiations.

Should Keep in Balance

Industry abounds with these conditions. They are the chief reason for ruined wage incentive plans and for chaotic labor relations. It should then be clear that this usual means whereby labor gets a portion of the savings of technological improvement through carelessness, ignorance, fighting and horsetrading is not the right solution. It should not be done by adulterating and disrupting the wage structure which should continue in the best possible balance.

2. If labor is to participate through the distribution of lump sums or bonuses, this must be done either from a distribution from profits at a date remote to the occurrence of the change in method, or it must be done at the time of the change and in anticipation of the saving.

a. Much thought has been given to profit sharing but with few exceptions it has not had a successful history because:

Payments once a quarter or once a year are too remote.

When losses occur, or profits shrink, and the amount of sharing drops, workers feel that their total earnings have been reduced through no fault of their own.

The incentive effect is too dilute. Workers would not propose the adoption of method changes on their jobs, in order to increase their share of profits by an infinitesimal amount at some later date.

The problem, then, is to find a solution which will leave the wage payment structure balanced and intact

(*Concluded on page* 170)

Meeting Calendar

Sept. 30-Oct. 1—All Canadian Conference of Eastern Canada and Newfoundland AFS Chapter, Windsor Hotel, Montreal

Oct. 1-2—Michigan Regional Foundry Conference, Michigan State College, East Lansing, Mich.

Oct. 12-16—American Chemical Society, Chicago Section, Fifth National Chemical Exposition, Chicago Coliseum, Chicago

Oct. 13-14—Magnesium Association, midyear meeting, Skytop Club, Skytop, Pa.

Oct. 14-15—Gray Iron Founders' Society, annual meeting, Haddon Hall, Atlantic City, N. J.

Oct. 14-15-16—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 18-20—National Metal Trades Association, 49th annual convention, Hotel Commodore, New York.

Oct. 18-22—National Safety Council, congress and exposition, Chicago

Oct. 21-22—Non-Ferrous Founders' Society, annual meeting, Warwick Hotel, Philadelphia

Oct.22—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Oct. 22-23—New England Foundrymen's Association, annual regional conference, Boston

Oct. 25-29—National Metal Congress and Exposition, Philadelphia

Nov. 4-5—Metals Casting Conference, Purdue University, West Lafayette, Ind.

Nov. 4-5—Industrial Management Society, 12th annual national time and motion study clinic, Sheraton Hotel, Chicago

Nov. 5—Malleable Founders' Society, eastern sectional meeting, New York

Nov. 11-13—Meehanite Casting Manufacturers, annual meeting, Pittsburgh

Nov. 15-16—Steel Founders' Society of America, fall meeting, Hot Springs, Va.

Nov. 18-19—National Founders' Association, annual meeting, Sheraton Hotel, Chicago

Nov. 19—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Dec. 2-4—American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Committee, annual conference, Hotel William Penn, Pittsburgh

1949

Jan. 10-14—Materials Handling Exposition, Philadelphia

Jan. 14—Malleable Founders' Society, semiannual meeting, Hotel Cleveland, Cleveland

Jan. 24-25—Industrial Furnace Manufacturers Association, meeting, Cleveland

Feb. 9-10—Steel Founders' Society of America, annual meeting, Chicago

Feb. 10-11—Regional Conference, Wisconsin Chapter of AFS, Milwaukee (Tentative)

Feb. 17-19—Regional Conference, Birmingham Chapter of AFS, Birmingham

Feb. 25—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Feb. 28-Mar. 4—American Society for Testing Materials, committee week, Edgewater Beach Hotel, Chicago

Mar. 4—Malleable Founders' Society, eastern sectional meeting, New York

Mar. 11-12—Ohio Regional Conference, sponsored by Ohio AFS Chapters, Ohio State University, Columbus, O.

Mar. 25—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

Apr. 18-20—American Institute of Mining and Metallurgical Engineers, National Open Hearth Steel Committee annual meeting, Palmer House, Chicago

Apr. 22—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

May 2-5—American Foundrymen's Society, annual convention, St. Louis

May 20—Malleable Founders' Society, eastern sectional meeting, New York

May 27—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead Hotel, Hot Springs, Va.

June 27-July 1—American Society for Testing Materials, annual meeting, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

Oct. 10-14—American Society for Testing Materials, Pacific Coast meeting, Fairmont Hotel, San Francisco

Note THESE ADVANTAGES OF DIXIE BOND..

Marked economies are realized with Dixie Bond because (1) its very high green strength permits using less material; (2) lumps are avoided, making shake-out fast and easy; (3) flasks last longer; (4) sand is not lost by sticking to castings or baking in pockets. Also, you get sound, hard molds with fewer jolts; soft, re-usable sand; fewer drops, swells, or cuts; better casting finish.

★ ★ ★

If your precise requirements are not met with Dixie Bond, they will be with one of our other four clays, or a combination of them.

★ ★ ★

EASTERN CLAY PRODUCTS, Inc.

Jackson, Ohio

VERY HIGH GREEN STRENGTH
•
HIGH PERMEABILITY
•
HIGH FLOWABILITY
•
EASY SHAKE-OUT

(*Concluded from page* 168)

and will not be as remote and dilute as the ordinary profit sharing plan.

It is therefore proposed that a lump sum labor cost reduction bonus be paid to workers whenever a change in incentive standards has become an actuality. The detail should be flexible. No stereotyped plan should be applied in a plant without knowledge of local conditions and of the attitude of all interested parties.

The following features are significant:

1. Whenever there is a change in manufacturing methods, material, equipment or conditions, there should be a corresponding change in the time or productivity standard so that these standards remain uniform and a reasonable measure of effort.

2. The new methods and standards should be put into effect by management with all necessary understanding on the part of the employees or representatives. There should, of course, be an opportunity for appeals by workers through the regular grievance procedure in case of misunderstanding.

3. After new standards have been in effect long enough to be considered accepted, say one month, a calculation should be made of the estimated first year's net saving. This would be equal to the known reduction in labor cost per unit of production, multiplied by the forecasted number of units per year, with adjustments for the expense of making the change. In some instances this number would be subject to considerable variation. If necessary, later calculations could be made.

4. A decision should be made as to the amount of lump sum bonus to be paid as a portion of the first year's savings.

In the case of method changes initiated by management this may be, say, 20 per cent to 30 per cent. For example, if the engineering division designs an automatic device which will enable an employee to run two machines instead of one, or which increases speeds or feeds, and if the yearly saving is estimated at $10,000, the amount distributed may be $2000. The method of distribution would depend on the organizational structure and other local conditions. If there are ten employees whose jobs are principally affected, each may be issued a check for $100. The remainder may be apportioned partly to a departmental pool and partly to a pool to be distributed to the division or the entire plant when its size has reached a certain minimum amount.

In the case of method changes initiated by a nonsupervisory employee, the award or bonus may be, say, 40 per cent to 60 per cent. A reasonable portion of this may go to the suggester, another portion to those affected by the change, and the remainder into a pool or pools. The fact that all those whose work is affected even remotely by the change would participate in the savings would tend to eliminate the feeling engendered against those who propose methods of reduction in labor cost. There would be tangible and immediate evidence that technological improvements are beneficial.

Reserve Part of Funds

Although the goal should be to institute technological improvements gradually enough to prevent layoffs, still, as time goes on, there may be necessary business curtailments for other reasons. A portion of the created pools could be reserved for a stabilization fund.

Incentive systems unfortunately are usually fraught with loose standards. They are caused either by management's errors in judgment, uncooperative studies, or small and intangible method changes.

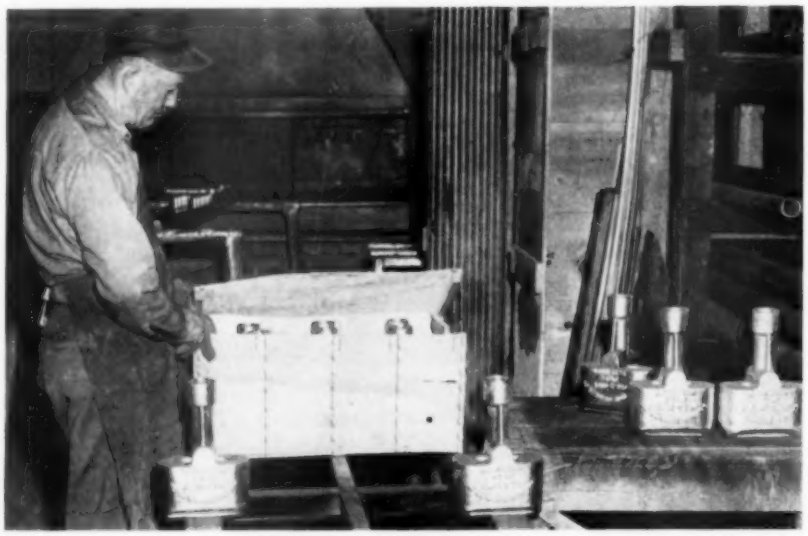
It is unwise for management to attempt to alter such standards. They are often, however, as troublesome to unions as to managements. When both groups agree upon new studies in such instances, management should be willing to make very considerable distributions of savings, perhaps 100 per cent of those estimated for the first year.

It may be desirable to all concerned to include supervision in the award. If so, a certain percentage of the award or the pool may be so distributed.

Many variations to this solution will occur in individual plants; no doubt new and important phases will arise. However, with leadership and co-operation, the application of these principles may well steer labor and management in the direction of better human relations and increased productivity with their ensuing mutual economic advantages.

Editor's Note: This paper was presented before a meeting of the National Conference of Business Paper Editors in Washington.

Pack Castings In Wirebound Boxes



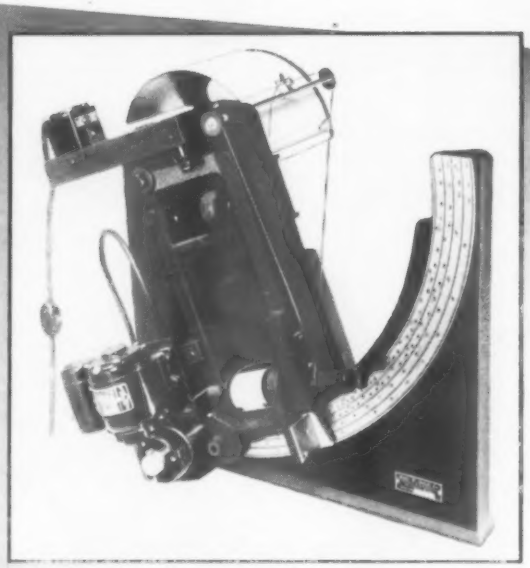
Losses due to disappearence and breakage of cast iron gas burner heads in the Southwest oil fields were a serious problem to the Anchor Burner Co., Oklahoma City, Okla.

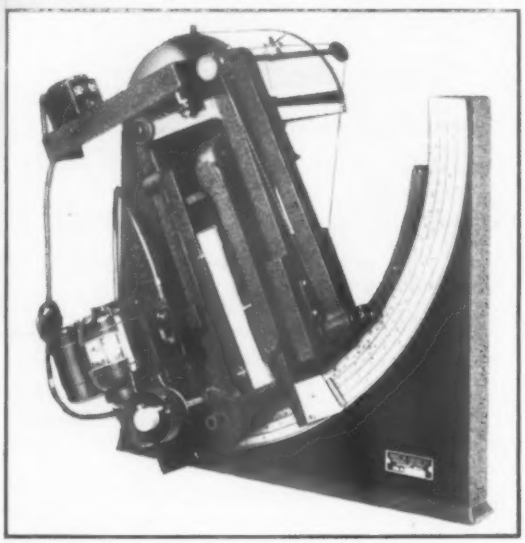
The company tried wiring the cast iron heads together, 10 to a bundle. Wires often broke and heads became lost.

Losses were practically eliminated by use of a wire-bound shipping container which weighs 9 lb. holds ten of the burner heads, or 150 lb. and carries them safely without danger of loss, pilferage or breakage. The box consists of three parts—top, bottom, and the one-piece wire-bound wrap-around "mat" that forms the sides. The "mat" is folded into shape during the actual packaging operation. A tight closure is made speedily by engaging opposing wire loops along the two end edges of the "mat" as they meet and bending the loops with a special tool so they hold tight. The whole packaging procedure takes only two or three minutes.

Strength-Deformation Recorder

the means to Greater Control of Molds and Cores





The workable strength of a molding material depends on its plasticity or yield load limit which is easily measured on the Dietert Strength-Deformation Recorder. Thus, bonds and sand preparation can be studied and varied to produce molds of maximum yield—molds which will withstand rough handling and minimize scrap losses.

CORES

The Strength-Deformation Recorder also measures the deflection of baked cores when loaded to determine their true load carrying ability. Low deflection cores break easily and high deflection cores are "raggy." Cores of proper deflection and strength are easy to work, minimize core loss and produce a maximum of good castings.

For specifications and prices, write to Dept. E.

5137

Harry W. DIETERT Company

9330 Roselawn Ave. Detroit 4, Michigan

CONTROL EQUIPMENT • SAND • MOLD • MOISTURE • CARBON • SULFUR

"Your Foundry Flasks Are Precision Tools"

. . . and every step along its huge assembly line, B S & B is meticulous in its effort to provide you with the finest. Welding, hydraulic truing, grinding and drilling of pinlugs (top to bottom) are done by experts. Again and again, each flask is inspected to insure perfect compliance with specifications.

BS & B's Exacting Workmanship Assures Accurate, Reliable Performance

Why take chances? Inexperienced, haphazard methods of flask manufacture can cost you money, waste time, create trouble.

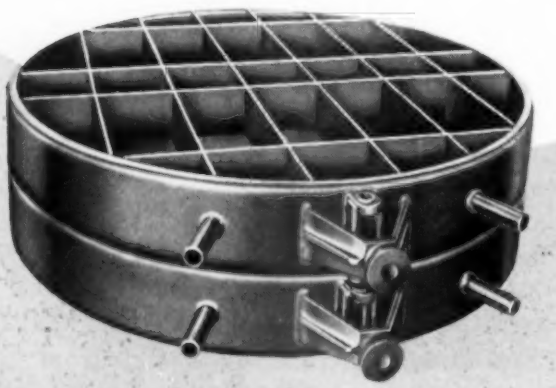
Black, Sivalls & Bryson pioneered the development of welded steel foundry flasks. B S & B originated the steel-bushed flask. Foundrymen of long experience make B S & B flasks. Craftsmen employing the most modern machines and techniques carry out your orders. All types and sizes can be fabricated in the vast B S & B plant. Yet these great advantages cost you no more.

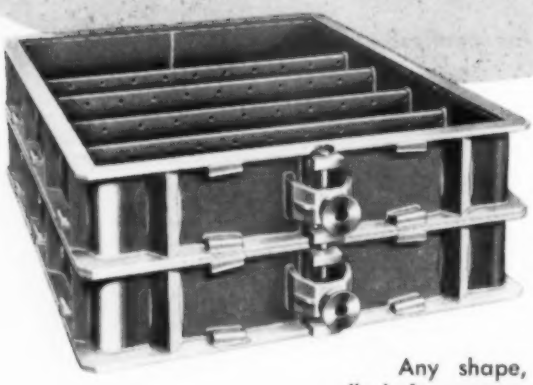
In these days of delay, you'll be pleased with the speed that B S & B fills your order. Write or wire today for full information. B S & B engineers and planners will be happy to help you with your problems.

BLACK, SIVALLS & BRYSON, INC.

Special Products Division

Power and Light Building **Kansas City 6, Mo.**





Any shape, any size flask for any purpose . . . built to your order by men who know the foundry!

AUTHORIZED BS & B DISTRIBUTOR

ORDER TODAY!
GET GOOD DELIVE
Distributors All Over th
Nation Ready to Serve

BIRMINGHAM, ALA.
Foundry Service Co.

BOSTON, MASS.
Klein-Farris Co., Inc.

BUFFALO, N. Y.
Queen City Sand & Supply Co.

CHICAGO, ILL.
S. Obermayer Co.

CINCINNATI, O.
Hill and Griffith Co.
S. Obermayer Co.

CLEVELAND, O.
C. L. Nash

DAYTON, O.
Fenton Foundry Sup. Co.

DETROIT, MICH.
Wolverine Foundry Sup. Co.
E. J. Woodison Co.

EDWARDSVILLE, ILL.
Midwest Foundry Sup. Co.

ELMIRA, N. Y.
F. F. Shortsleeve Co.

FT. WORTH, TEX.
Ralph A. Carlson

LOS ANGELES, CALIF.
Independent Foundry Supply Co.

MINNEAPOLIS, MINN.
Foundry Supply Co. Inc.

MONTREAL, CAN.
Canadian Foundry Sup. & Equipment Ltd.

OAKLAND, CALIF.
Pacific Graphite Co. Inc.

PHILADELPHIA, PEN
Pennsylvania Foundry Sup. & Sand Co.

PITTSBURGH, PENN.
S. Obermayer Co.

ST. LOUIS, MO.
M. A. Bell Co.
M. W. Warren Coke Co.

TORONTO, CAN.
Canadian Foundry Sup. & Equip., Ltd.

PERMANENT MOLD GRAY IRON CASTINGS BY THE MILLION

(*Continued from page 87*)

machine heads rotate.

It may be pertinent to review essential features of the permanent mold machine which has remained essentially unchanged in design since its inception. It is in reality an actuating mechanism to open, cool, carbon coat and close the 12 mold heads, performing no molding function as such. On a large round base is mounted a revolving dodecagon hub to which are bolted 12 hollow steel arms about 5 ft in length extending radially as the spokes of a wheel. Joining the arms at their extreme ends are outer heads, to each of which is attached half of the mold. These heads are cast with a hollow section which permits a flow of cooling air to be drawn across the back of each outer mold half, through the head and radial arms into the hub from which it is exhausted. A blower rated at 15,000 cfm is furnished with each machine, providing a calculated air flow of 500-600 cfm across the back of each of the 24 mold halves.

Molds Easily Changed

Twelve inner, or moving heads are mounted on rollers, movement being actuated by 8-in. air cylinders operated by three-way valves, their action being to close, hold and then open the molds, with the cycle controlled by upright arms which contact opening and closing cams. Each inner head has a telescopic device which permits the same volume of air to flow across the back of the inner mold half as flows across the outer one. Molds are attached to the heads by means of two bolts and can be changed in about 10 minutes by one operator.

The machine is rotated by means of a ring gear attached to the hub and a pinion gear driven by an electric motor through a positive variable speed drive, providing any desired speed from one revolution in 2 minutes to one revolution in 6 minutes. Speed of the machine is determined by the size of the castings being poured which in turn governs the length of time necessary to cool the mold and solidify the casting for ejection. Standard procedure is to set the cycle of the machine according to past experience with castings of similar mass and contour and then accelerate or decelerate to secure exact cycle speed for efficient operation and sound castings. Molds are maintained as closely as possible to 700°F.

The machine operates continuously, all operations being performed while it is in motion; however, it can be stopped and started by the operator through conveniently located switches. Attached to each machine just ahead of the pouring station is a smoke hood inside of which are a series of vertical perforated pipes through which compresed air can be directed to clean off the mold faces thoroughly, after which, through similar pipes, multiple acetylene flames are automatically played over the open mold surfaces to give a uniform thin layer of carbon essential to successful casting. The acetylene manifold also is used to direct a natural gas flame over the mold faces to preheat them prior to starting a day's operation. The hood, of course, protects the operator when molds are being blown off and smoked. A cam on each outer head actuates valves to control compressed air and acetylene.

Each machine has two operators, one man to pour and one to remove castings.

Sand cores treated with a special coating are employed in the conventional way for hollow castings such as pistons, cylinders, etc., and are provided with especially designed core prints to permit them to hang vertically in the permanent mold. When cored castings are being produced, an additional operator is needed to "hang" cores in the outer mold half.

A coreroom is maintained to produce cores on bench, blower and roll over machines. Cores are dried in tower conveyor type and rack type ovens, about 95 per cent of them being dipped and redried in smaller tower type ovens.

In pouring it is vital that care be exercised to see that the top face of the mold is free of oxide and foreign material, and also to have the downstream from the ladle aimed directly into the downsprue to avoid a swirling action which would draw in air and lead to possible blowholes. The casting is allowed to remain in the mold for 40-120 seconds to solidify, depending upon its mass, after which the mold opens and the castings are removed by the operator and placed into skips.

Cooled By Air Stream

As mentioned previously, the cycle covering all types of castings is from 2 to 6 minutes. During the entire cycle the molds are being cooled by the air stream being drawn across cooling pins covering the back faces of the molds. These pins, cast directly into the molds, measure about ¼-in. in diameter at the top, ½-in. at the bottom, and are about 1½ in. deep, spaced on 1-in. centers. Solid backing of the mold face is roughly ¾ to 1 in. thick.

It is not necessary for the machine to have all 12 molds on the machine of the same part, since it is entirely possible to cast 12 different types of castings on one machine, providing the mass of metal in each mold is in balance. As mentioned before, the determining factors are pouring and solidifying time, and the amount of heat to be extracted from the casting is the primary element which is involved.

Obviously the design of the mold itself for each individual type of casting or multiple castings calls for particular care. The following factors must be kept well in balance: Correct location of the cavity or cavities, core prints, downsprue, gates, pouring basin, vents, risers, overflow traps and metal thickness around the cavity. The latter is important not only to extract heat from the casting as it cools, but also to allow proper heat distribution throughout the mold so that localized hot or cold spots, destructive to mold life and casting soundness, may be avoided.

Molds, as designed for Eaton permanent mold machines, are standard

---

Review of progress made the last 15 years at the Foundry Division of Eaton Mfg. Co., Vassar, Mich., has been made possible through the co-operation of the company's energetic general manager, Edward C. Hoenicke. Serving with General Motors Corp., then the Holley Permanent Mold Machine Co., Erb-Joyce Foundry Co., Eaton-Erb Foundry Co. and the successor to the latter two, the present Eaton foundry division, he also has been active in affairs of the National Founders Association, Gray Iron Founders' Society and American Foundrymen's Society. He is a past chairman of the Detroit Chapter of the latter group, member of the board of directors of the GIFS and member of the administrative council of the NFA, as well as a trustee of the Gray Iron Research Institute. During the war he served as first head of the gray iron castings section of the War Production Board in Washington.

E. C. HOENICKE

---

and interchangeable, four sizes covering the entire range of castings. Bosses to attach the mold to the machine, and side bosses for dowel pins are cast integral and the entire mold is of an iron of identical analysis with that of the castings produced in it. The mold usually is divided in the center by the downsprue, but offset sprues are used occasionally. At right angles, in T-design, at the bottom of the downsprue, is the runner in a horizontal plane practically across the entire face of the mold. Cavities are placed above the runner and are connected by the gate. Size of the latter is usually 0.065-0.0875-in., but experience and tryout are the determinants.

In multiple molds, one cavity is above the other, and the riser of the bottom cavity is the gate for the upper cavity. Above the top cavities are the risers, shrink-bobs and metal traps. The top of the mold, at a 5-degree angle to the face, is divided into three parts—the center for a pouring basin, and the two outer sections including pools directly above the risers for receiving overflow metal.

Proper design of cores and core prints poses problems both from core-holding and core-venting standpoints. The molds, of course, are not permeable, and hence sufficient vent must be allowed at all times. One side of the core print should always face the open air and the core itself should be as permeable as possible, and also should be well vented. In exceptional cases relief cuts are made across the face of the mold for gas removal, but only as a last resort since these vents become filled with carbon during the casting operation.

Sequence of operation in preparing a mold starts in the drafting room. An expert layout man first makes a casting drawing from the customer's part print, showing parting line, draft angles, and finish allowances. A mold drawing is made from this, showing the proper location of all the various elements mentioned earlier. A hardwood master pattern then is made with the cavity dimensions correct to size, except at the core prints and where extreme accuracy is demanded on the casting. At these points about 1/16-in. is allowed for machining purposes. The mold is cast in dry sand and after sandblasting, the mold faces are machined and dowel pins inserted.

The mold then is transferred to a surface plate where an experienced layout man indicates where the mold is to be machined. The cavity is cut with conventional die-sinking equipment and machine tools, and is finished with hand tools and flexible shaft grinders. Vent plugs are inserted and the mold is ready for base coating, a refractory material of sodium silicate and kaolin, applied after the mold has been heated to about 400°F. It is then ready for tryout with molten lead to determine mismatch and dimensional accuracy of the mold. The mold is poured with iron to secure a sample for customer approval, after which it is ready for production.

Pattern Cast To Size

An interesting variation of the above is being experimented with by Eaton engineers. Since extended labor is necessary to cut the cavity into the mold face and finish it off, the idea was conceived of casting the mold in the first place with the cavity approximately to finished size so that only a light grind would be necessary to ready the mold for production. Preliminary tests disclose important possibilities in the direction of reducing mold cost by this method. Casting buyers, of course, assume the cost of mold production and the molds subsequently become their property, although stored by the foundry. Naturally, a large mold storage area is involved, since they often must be kept for several years after a run of castings.

A considerable volume of acetylene gas is required to operate the smoke manifolds on the 18 permanent mold machines. It is generated in a recently-built acetylene station, a compact brick and steel building set entirely apart from the rest of the foundry for reasons of safety. Six large acetylene generators are operated continuously during production periods. They are entirely automatic except for loading and trucking away the spent chemical. Each generator requires 500 pounds, or two drums, of calcium carbide per charge and a little over four charges per day is the average during peak production.

(*Concluded on page* 176)

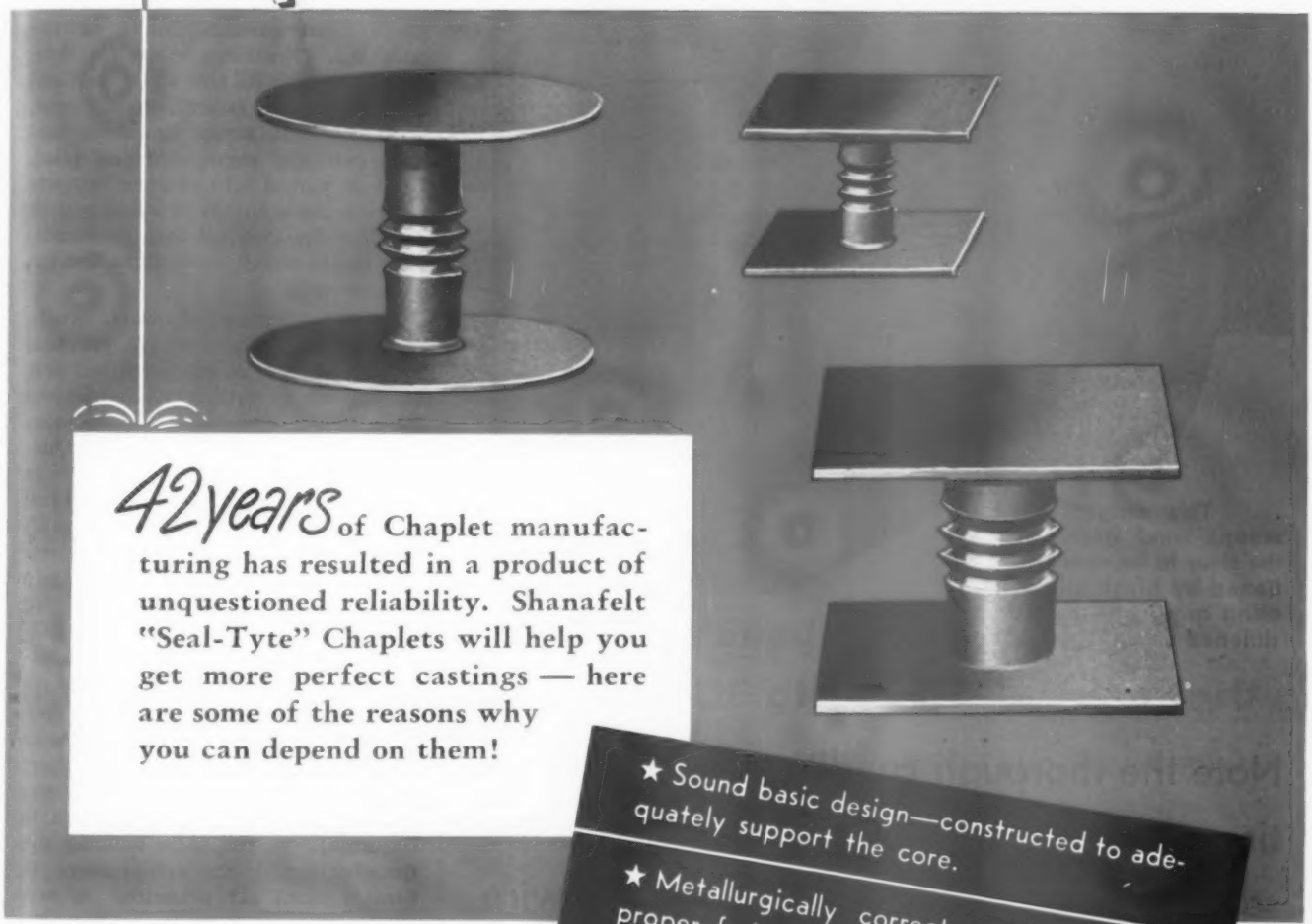
Lebanon Licensee for New Casting Process

LEBANON Steel Foundry, Lebanon, Pa., has become the exclusive American licensee of Firth-Vickers Stainless Steels Ltd., Sheffield, England, for the production of alloy steel castings by the latter's permanent mold centrifugal casting process known as the Centri-Die process. Shown above, signing the licensing agreement in Lebanon recently, are left to right: A. E. Thornton, associate director, and Carl E. Holmstrom, managing director for Firth-Vickers; T. S. Quinn, partner and treasurer, and William H. Worrilow, president of Lebanon Steel Foundry.

According to Mr. Worrilow, the new process is particularly useful in the production of castings designed for exceptional heat and corrosion resistant service. "Because of the unusual design characteristics and integrity of castings made by the process, the way is opened to production of cylindrical and tubular structures which are difficult or impossible to forge or cast by any other method," he stated.

Firth-Vickers has pioneered the development of heat-resistant alloys required to withstand the terrific temperatures and stresses generated in jet engine operation, and the Centri-Die process is a direct outgrowth of earlier development work pushed to completion during the war, when it became urgent for Britain to perfect the jet fighter plane. The process will be made available for use in the production of vital turbojet components needed in the U. S. military aircraft engine program, but is also adapted to the casting of parts for many other uses.

Always Dependable



42 years of Chaplet manufacturing has resulted in a product of unquestioned reliability. Shanafelt "Seal-Tyte" Chaplets will help you get more perfect castings — here are some of the reasons why you can depend on them!

★ Sound basic design—constructed to adequately support the core.

★ Metallurgically correct materials mean proper fusing, with special fin edge stems for pressure tight work.

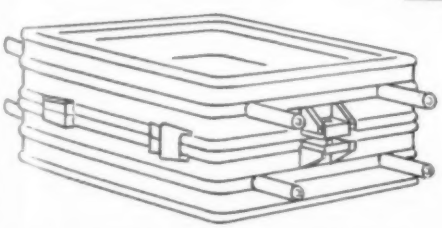
★ Careful manufacturing and inspection assures uniformity in size and quality.

We specialize in double heads and carry a large stock for immediate delivery of most sizes. Your orders or price inquiries will always receive prompt attention.

The SHANAFELT Manufacturing Co.

ESTABLISHED 1893

2600-2700 WINFIELD WAY, S. E. • CANTON, OHIO

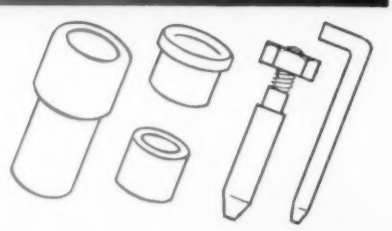


ONE PIECE STEEL FLASKS

The Shanafelt Flask is strong, accurate, and long wearing, yet light in weight for easy handling.

Shanafelt hardened Steel Flask Pins and Bushings are made to the standards required for most efficient Flask handling.

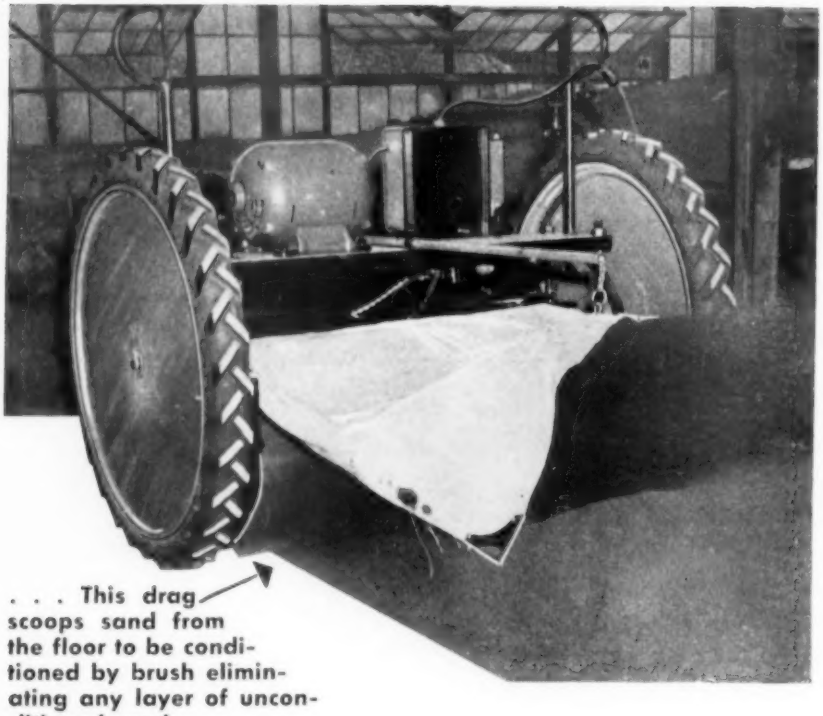
Your inquiries will receive immediate attention from the home office in Canton, Ohio or from our representative in your district.



FLASKS PINS AND BUSHINGS

"The Moulders' Friend"

CONDITIONS ALL THE HEAP — LEAVES NO UNCUT SAND



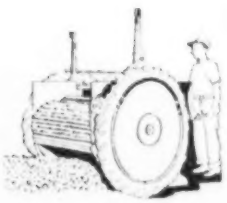
. . . This drag scoops sand from the floor to be conditioned by brush eliminating any layer of unconditioned sand.

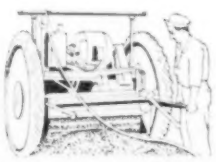
Note the thorough conditioning of the entire sand heap as the drag bar scoops the sand from the floor, and thousands of wire bristles in the brush pulverize and throw all of the sand, bond and moisture into the canvas hood to complete the job of thoroughly mixing, aerating and blending the sand heap.

"The Moulders' Friend"

SAND CONDITIONING EQUIPMENT

Dallas City, Ill.





(*Concluded from page* 174)

All generators feed into a common line and pressure is maintained at around 2 pounds.

The visitor to the plant is impressed with the fact that here is a gray iron foundry which has about as little resemblance to the typical iron castings plant as is possible to imagine. Broad expanses of velvet green lawn surround most of the buildings. The large materials storage yard, with its two 70-ft overhead traveling cranes is scrupulously neat, with pig iron, scrap, limestone and coke carefully segregated and piled. Coke is placed into storage hoppers where a day's supply or more can be held for drawing off into automatic skip hoists which move it to the cupola.

Spacious lockers, showers, washrooms and lunchrooms are provided for employees. A well equipped first aid dispensary with registered nurses in attendance provides maximum health protection. On the production floor, everything is neat and in order. Batteries of end grinders and centerless grinders operate in a well-lighted department from which every trace of dirt and dust is continuously exhausted. Inspection benches are clean and well illuminated. Two railroad spurs and a truck will efficiently handle all outgoing shipments.

A new boiler plant with two 180-hp units, arranged to be fired with oil or coal, if either should be in short supply, handles heating requirements of the plant (winters are severe in the area). In the same building are five horizontal air compressors to furnish plant air pressure. A new 125-ft brick stack adjoining the boiler room is a landmark which can be spotted for miles. Factory offices all have been remodeled and re-equipped with the latest types of ventilation, illumination and furniture.

These steps taken by a far-sighted management to create and maintain good housekeeping and good working conditions cannot help but pay off in a better product, better employee morale, improved efficiency and — better profits.

Publishes Booklet

Foundry Services Ltd., Birmingham, England, has published a 111-page booklet which contains a number of useful tables and information of value to the foundryman such as physical properties of metals, conversion tables, design of feeding heads, British standard specifications for ferrous and nonferrous castings.

VELSICOL

America's FOREMOST CORE OIL!

Foundry Performance is PROOF of VELSICOL Superiority

Your own tests will prove that VELSICOL light-colored core oils offer greater economy—are geared to greater castings production in your foundry. They represent the greatest dollar value available in core oil because only VELSICOL manufactures and controls, under rigid laboratory specifications, the hydrocarbon resins that assure uniform quality to these light color oils. Many foundries have switched to VELSICOL, for this core oil develops the highest strength to gas evolution ratio of any core, and consequently gives a smooth and clean casting finish. So for unexcelled workability, change to VELSICOL—America's foremost core oil!

"VELSICOL"

VELSICOL CORPORATION

General Offices: 330 East Grand Avenue, Chicago 11, Illinois
Branch Offices: New York • Detroit • Cleveland

Manufacturers of: **Insect Toxicants • Aromatic Solvents • Core Oils**

Representatives:

F. F. PEARLES CO.
Detroit, Mich.

W. A. ZEIS
St. Louis, Mo.

FOUNDRY SUPPLY CO., INC.
St. Paul 4, Minn.

H. S. STOLLER & CO.
Akron, Ohio

MANUFACTURER'S EQUIPMENT & SUPPLY CO.
Chattanooga 2, Tenn.

WILSON INDUSTRIES
Cambridge 42, Mass.

THE TRABON CO.
Chicago, Ill.

GENERAL FOUNDRY SERVICE CORP.
Oakland, California

FOUNDRY STATISTICS

Index of Foundry Equipment Orders

Foundry Trades Only
(Net Orders Closed, New Equipment)

	1947	1948
Jan.	466.9	380.9
Feb.	472.5	367.3
Mar.	532.3	326.2
Apr.	445.9	412.0
May	525.9	388.5
June	658.9	376.8
July	426.1	456.3
Aug.	411.3	....
Sept.	393.1	....
Oct.	438.2	....
Nov.	286.1	....
Dec.	467.8	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Estimated Number of Foundry Production Workers

Type Foundry	May 1948	Apr. 1948	May 1947
Gray Iron	107,100	110,700	115,500
Malleable Iron	37,300	37,200	34,600
Steel	68,400	68,600	66,400

Source: Bureau of Labor Statistics. Estimates adjusted to Federal Security Agency data through 1945.

Castings Production

In Philadelphia Federal Reserve District
(July, 1948)

Type	Percentage Change From:	
Foundry	June, 1948	July, 1947
Gray Iron	—28.9	—22.2
Malleable Iron	—22.5	+50.6
Steel	—49.9	—19.8
Nonferrous	—34.9	+56.3

Source: University of Pennsylvania.

Average Earnings and Hours of Foundry Workers

Type Foundry	Average Weekly Earnings			Average Weekly Hours		
	May 1948	Apr. 1948	Mar. 1948	May 1948	Apr. 1948	Mar. 1948
Gray Iron	$55.15	$56.39	$58.47	39.3	40.2	41.8
Malleable Iron	57.21	56.77	57.79	40.5	39.8	40.8
Steel	60.49	60.13	59.88	41.3	41.2	41.3

Source: Bureau of Labor Statistics.

—SHIPMENTS OF CASTINGS—

(Reported by Bureau of the Census)

Gray Iron Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1946			
TOTAL	10,269,657	6,102,246	.....
1947			
Feb.	1,009,970	583,252	2,986,741
Mar.	1,089,828	633,844	2,979,326
Apr.	1,097,150	636,708	2,907,694
May	1,097,307	636,013	2,782,706
June	1,038,356	596,874	2,710,854
July	912,939	519,137	2,675,138
Aug.	951,859	550,961	2,631,273
Sept.	1,025,089	590,702	2,679,858
Oct.	1,154,192	654,426	2,668,781
Nov.	1,020,239	561,660	2,687,244
Dec.	1,066,211	587,933	2,782,236
TOTAL	12,540,960	7,181,299	.....
1948			
Jan.	1,064,335	584,238	2,802,685
Feb.	1,024,450	571,406	2,769,408
Mar.	1,169,085	659,821	2,726,415
Apr.	1,051,083	584,969	2,690,893
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081

* For sale only.

Steel Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1946			
TOTAL	1,432,049	1,043,358	.....
1947			
Feb.	125,612	92,822	421,405
Mar.	134,909	99,701	434,865
Apr.	144,175	106,127	427,554
May	140,874	103,779	443,225
June	139,031	103,888	445,475
July	116,956	85,014	473,923
Aug.	120,405	88,719	478,649
Sept.	137,457	102,913	526,229
Oct.	148,358	111,288	497,344
Nov.	130,125	97,143	493,309
Dec.	148,124	110,970	489,364
TOTAL	1,625,055	1,203,504	.....
1948			
Jan.	141,068	108,282	491,745
Feb.	142,434	107,762	497,097
Mar.	162,891	125,550	508,822
Apr.	150,305	114,896	472,370
May	143,337	111,616	482,531
June	152,894	117,794	469,973

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1946			
TOTAL	752,028	452,355	.....
1947			
Feb.	74,716	41,684	274,018
Mar.	76,614	43,488	280,724
Apr.	81,890	47,303	275,415
May	75,478	42,294	262,117
June	78,524	45,291	248,798
July	64,162	40,733	234,656
Aug.	62,404	38,165	229,735
Sept.	71,568	40,138	218,276
Oct.	83,979	47,673	210,695
Nov.	72,111	39,969	206,510
Dec.	77,757	44,042	202,408
TOTAL	895,054	513,228	.....
1948			
Jan.	77,744	45,808	205,759
Feb.	75,194	42,582	209,447
Mar.	86,767	50,017	203,351
Apr.	80,602	45,941	199,578
May	76,079	42,261	191,553
June	81,747	48,113	178,760

* For sale only.

Aluminum Castings

(Thousands of pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled *Orders
1946				
TOTAL	388,711	160,845	153,138	.....
1947				
Feb.	35,904	12,936	15,148	128,999
Mar.	40,135	13,791	17,509	121,038
Apr.	39,438	13,633	16,605	112,926
May	37,400	13,646	14,514	112,548
June	32,986	11,775	13,105	102,758
July	30,197	10,095	11,739	101,370
Aug.	30,441	10,908	11,342	94,658
Sept.	35,877	12,228	14,146	94,637
Oct.	40,532	13,855	15,685	85,012
Nov.	34,683	11,428	13,558	83,975
Dec.	37,489	12,552	13,784	81,784
TOTAL	441,996	155,112	174,515	.....
1948				
Jan.	37,889	12,670	15,020	86,176
Feb.	37,963	12,177	15,055	88,032
Mar.	41,794	13,343	16,258	78,344
Apr.	38,269	12,407	14,563	78,499
May	33,868	11,854	12,351	75,219
June	35,822	12,296	13,239	72,930

* For sale only.

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled *Orders
1946				
TOTAL	898,952	832,037	26,520	.....
1947†				
Feb.	78,729	73,863	2,046	76,016
Mar.	83,195	77,113	2,623	74,422
Apr.	84,196	78,760	2,253	69,392
May	90,054	81,851	4,732	73,550
June	84,604	77,402	3,829	67,119
July	70,603	64,686	3,284	70,002
Aug.	75,060	68,271	4,021	68,659
Sept.	83,158	75,728	3,976	69,919
Oct.	92,119	83,592	4,763	67,280
Nov.	81,803	74,274	3,773	73,851
Dec.	87,215	79,495	4,393	74,814
TOTAL	1,051,742	960,732	51,139	.....
1948†				
Jan.	85,432	77,433	4,593	74,579
Feb.	87,169	79,329	4,509	71,143
Mar.	96,344	87,249	5,261	70,544
Apr.	89,035	80,426	4,705	70,726
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149

* For sale only.

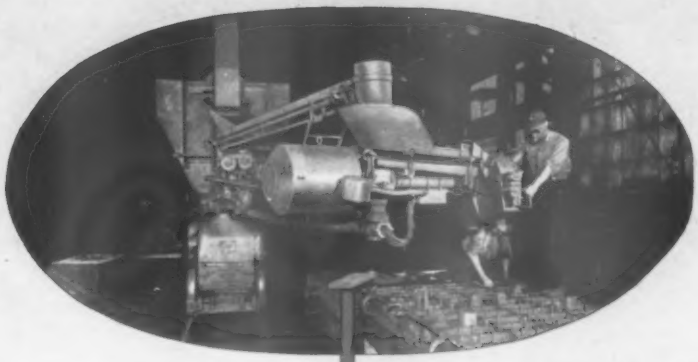
† 1947 and 1948 figures include copper and copper-base alloy castings.

Magnesium Castings

(Thousands of pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled *Orders
1946				
TOTAL	8,472	7,149	532	....
1947				
Feb.	707	605	69	3,776
Mar.	677	593	45	3,276
Apr.	627	526	78	3,245
May	628	481	104	3,297
June	613	476	93	3,183
July	492	372	67	2,772
Aug.	523	382	83	3,267
Sept.	518	421	56	2,747
Oct.	616	557	21	2,659
Nov.	602	540	31	2,808
Dec.	669	586	39	2,730
TOTAL	7,693	6,404	729	....
1948				
Jan.	659	592	...	2,701
Feb.	655	566	...	2,866
Mar.	704	645	...	2,741
Apr.	673	588	...	2,640
May	622	540	38	2,675
June	709	666	4	2,712

* For sale only.



1. MOTIVE JR. SANDSLINGER

Modern, efficient ramming for the jobbing foundry! Large, medium and small molds and cores are rammed easily, quickly, thoroughly and accurately by the Motive Jr. Sandslinger.

BETTER METHODS

by BEARDSLEY & PIPER

DIVISION OF PETTIBONE MULLIKEN CORP.

2424 N. Cicero Ave., Chicago 39, Illinois

2. SPEEDMULLOR

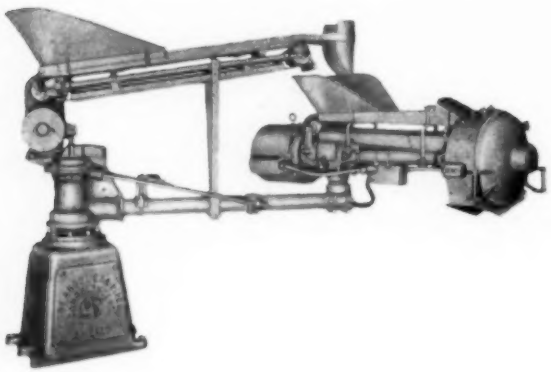
Guaranteed fastest, most thorough, mulling! The only mullor with a 1 to 1½ minute mulling cycle—and with positive cooling during the same short cycle. Six sizes, 3 to 20 cu. ft. batch capacity to meet the requirements of any foundry.

3. MOTIVE SPEEDSLINGER

Peak ramming capacity for large floor or pit molds and cores is attained with the Motive Speedslinger! Like the Motive Jr. Sandslinger it carries its own sand to the job.

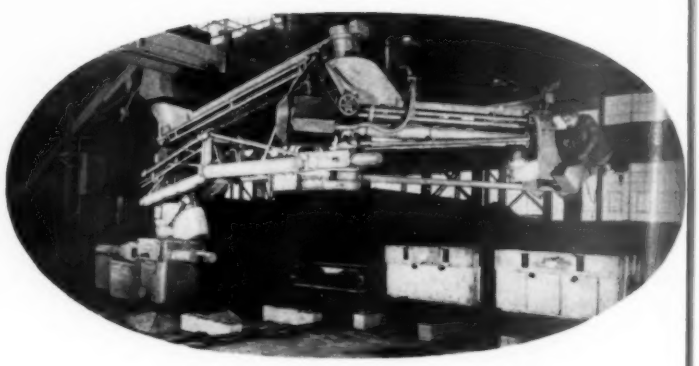
B&P equipment meets the sand preparation, sand mulling and sand ramming requirements of all types of small, medium and large foundries

BETTER METHODS BY BEARDSLEY & PIPER



4. STATIONARY SANDSLINGER

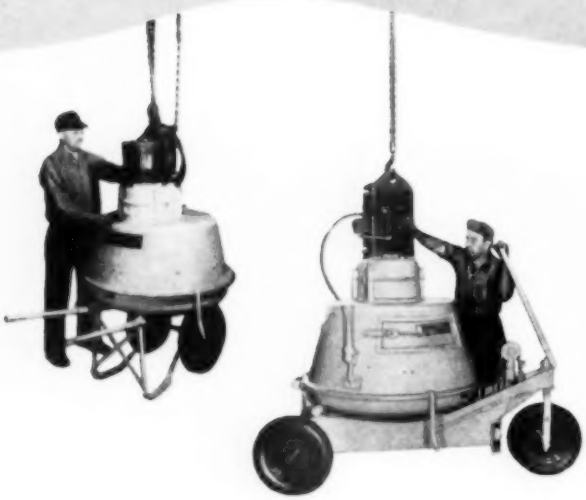
Hundreds of foundries, both jobbing and production, use the versatile Stationary Sandslinger for ramming large numbers of small and medium sized molds on either production or short run patterns.



5. STATIONARY SPEEDSLINGER

Greatest ramming capacity and highest production of molds and cores is attained with the Stationary Speedslinger, particularly when used in conjunction with a B&P Turntable. 4 models including one for complete automatic operation.

B&P equipment meets the sand preparation, sand mulling and sand ramming



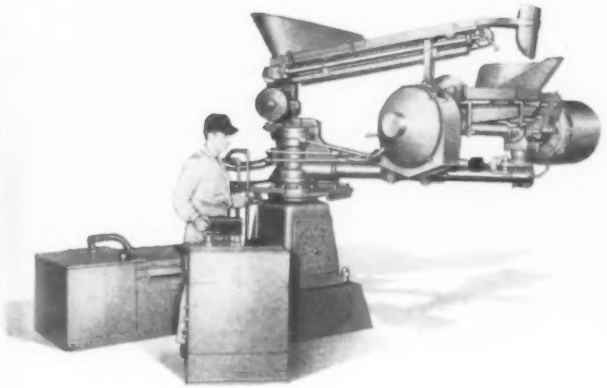
8. MULBARO

The only really portable mullor! Thorough, complete mulling at low cost. This versatile machine is ideal for all sizes and types of foundries. Two models provide a choice of 3½ and 7 cu. ft. capacities.

9. SCREENARATOR

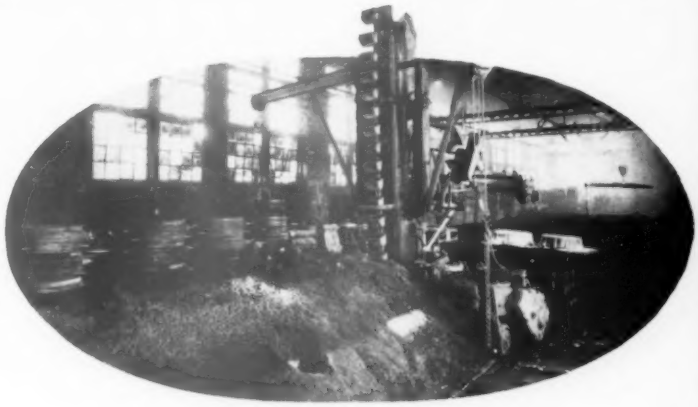
Low cost, portable sand preparation unit. Screens, double aerates and blends. Produces a clean even-tempered molding sand. Three models with capacities of 750, 1000 and 1500 pounds per minute.

BETTER METHODS BY BEARDSLEY & PIPER



6. HYDRA-SLINGER

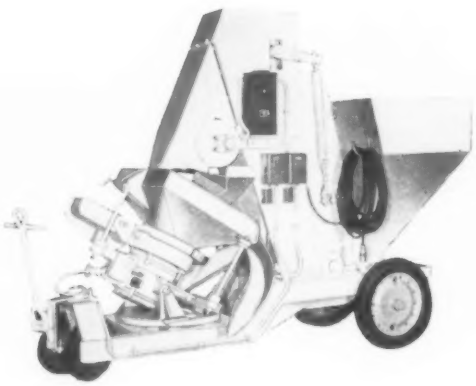
The Hydra-Slinger is a power operated Stationary Sandslinger with remote hydraulic control directing the movement of the ramming arms from a vantage point best suited to the particular installation.



7. TRACTOR SANDSLINGER

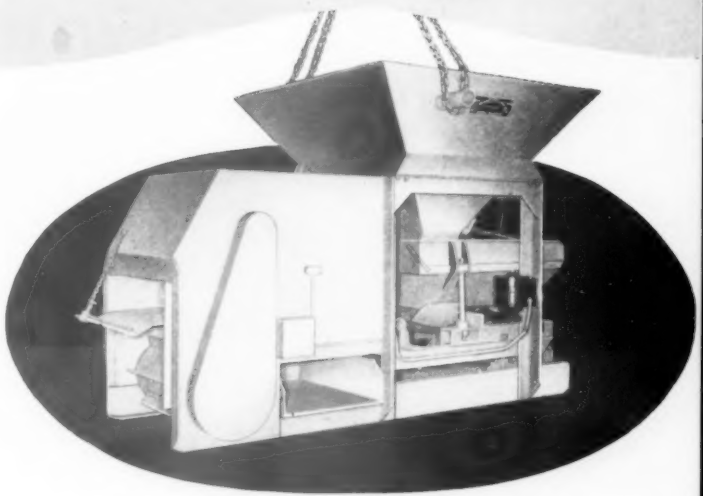
A completely self-contained unit, the Tractor Sandslinger rams the sand it has previously prepared. Foundries having no sand preparation units find that this versatile machine meets their exact requirements.

requirements of all types of small, medium and large foundries



10. JUNIOR NITE-GANG

The only really portable molding sand preparation machine for the small foundry. It provides magnetic separation, screening and aeration . . . all in one unit. This efficient Nite-Gang eliminates hand shoveling—has a capacity of 20 tons per hour.



11. PREPARATOR

Heavy duty, portable sand conditioner—provides thorough screening, lump breaking, magnetic separation and aeration. Has perfect balance for crane portability. Capacity . . . 60 tons per hour. There is also a model without the magnetic separator.

BEARDSLEY & PIPER *DIVISION OF PETTIBONE MULLIKEN CORP.*

General Offices: 2424 North Cicero Avenue • Plant: 2541 North Keeler Avenue • Chicago 39, Illinois

BETTER METHODS

BY BEARDSLEY & PIPER

12. CHAMPION SPEED-DRAW

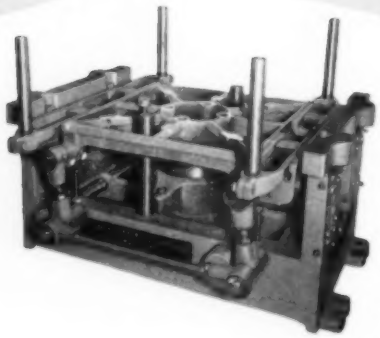
A pin-lift machine that quickly and accurately draws the mold from the pattern . . . assuring high mold production. Pattern changes made with minimum interruption. Air or hand operated, 11 Speed-Draw Models, both Stationary and Portable, to cover maximum range of mold sizes.

13. B&P PLATE FEEDER

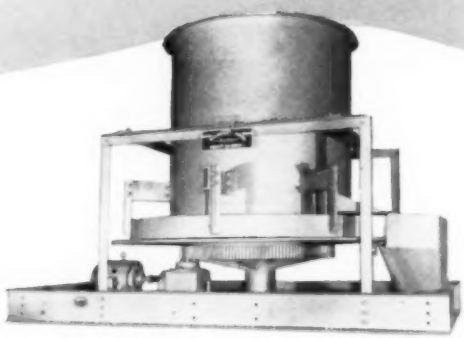
Provides a constant, uniformly measured supply of sand to assure peak capacity operation of Stationary Sandslingers, Speedslingers and Swingslingers. Simple, rugged construction permits easy, immediate installation.

14. B&P TURNTABLE

Used by many leading foundries in their Stationary Sandslinger, Speedslinger and Swingslinger units to attain the maximum speed of mold ramming. Can be equipped with hydraulic drive for the automatic indexing in various molding operations.

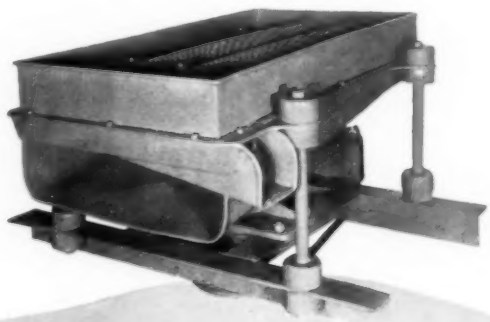


12.



13.

14.



15.

15. B&P GYRATORY SCREEN

Provides complete and thorough sand screening. The B&P Gyratory Screen has proven its efficiency through years of use in foundries throughout the country. Simply constructed, yet sturdy and rugged, it assures long, trouble free operation.

BEARDSLEY & PIPER
Division of Pettibone Mulliken Corp.
2424 N. Cicero Ave., Chicago 39, Illinois

SEND CATALOG ON:

- ☐ Motive Jr. Sandslinger
- ☐ Speedmuller
- ☐ Motive Speedslinger
- ☐ Stationary Sandslinger
- ☐ Stationary Speedslinger
- ☐ Hydra-Slinger
- ☐ Tractor Sandslinger
- ☐ Mulbaro
- ☐ Screenarator
- ☐ Junior Nite-Gang
- ☐ Preparator
- ☐ Champion Speed-Draw
- ☐ Plate Feeder
- ☐ Turntable
- ☐ Gyratory Screen

☐ HAVE B&P REPRESENTATIVE CALL

FOUNDRY_____

ATTENTION_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Send this Coupon

Printed in U.S.A.

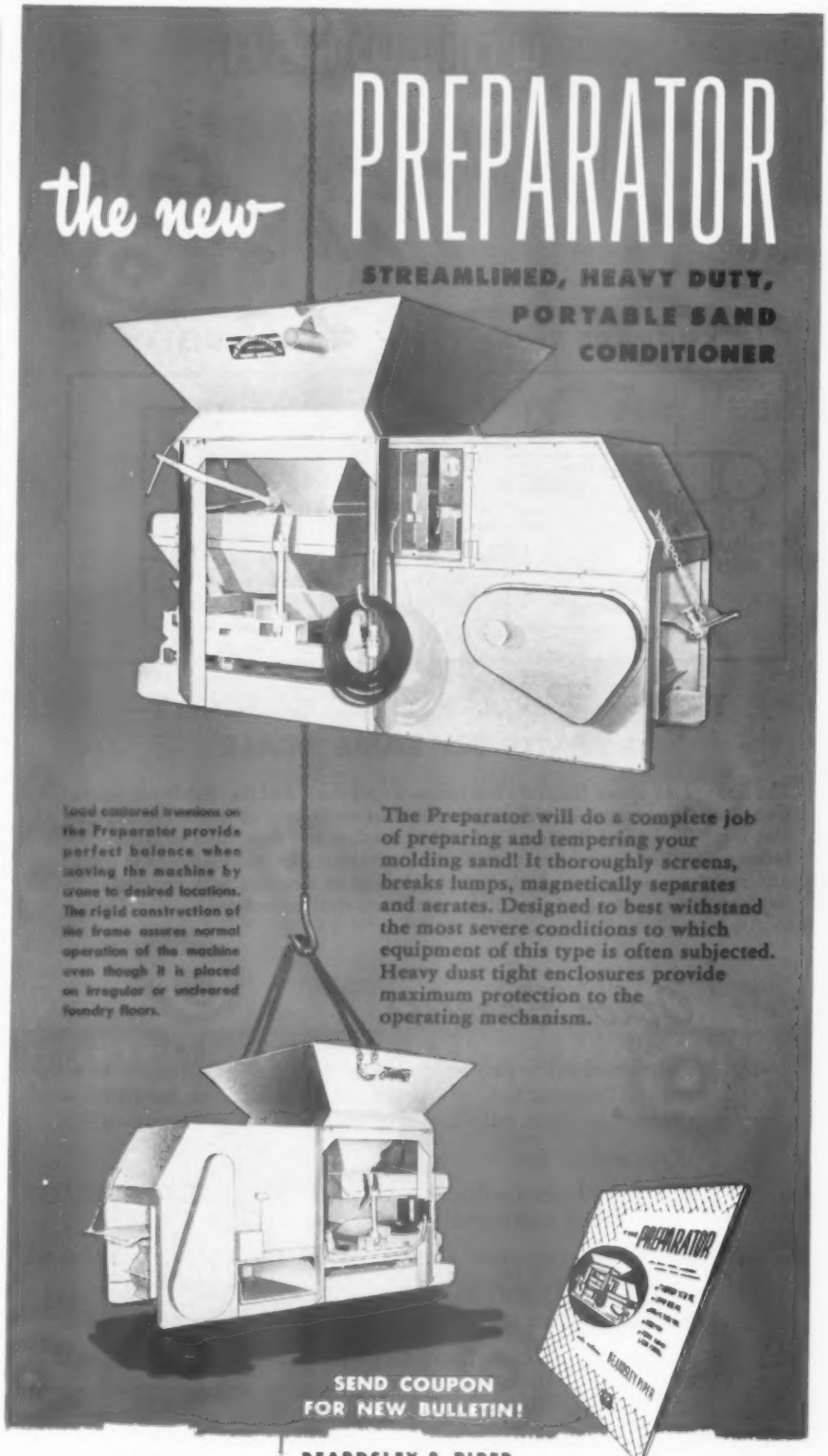
CASTING STEEL CENTRIFUGALLY

(*Continued from page* 91)

hub and spokes is taken by a central downgate with sprues radiating from it like the spokes of a wheel. In that case, if enough steel is poured in to fill the sprues and downgate completely, the above expression for the pressure at the periphery is true as long as the steel is still fluid. If only enough steel is poured in to just fill the casting and partly fill the sprues, however, the pressure is reduced by an amount that varies with the ratio of R_1, the radius at the point where the sprues become empty, to R, the outer radius of the casting. The nearer R_1 approaches R the smaller will be the value $1 - \frac{R_1^2}{R^2}$, and hence the lower the pressure.

This latter condition greatly influences the usefulness of lumps of metal placed at the ends of the sprues in an effort to more effectively feed the contraction of annular castings poured and spun by the semi-centrifugal process. Suppose, for instance, that on a sprocket with an outside diameter of 60 in. and a thickness of 3 in., lumps 5-in. wide are placed at the ends of the sprues, as in Fig. 19, to feed the contraction in the rim, after the sprues have frozen off. The last place to freeze in the rim will be aproximately at the median line, or at a radius of 28½ in. If the casting is spun to give a peripheral surface speed of 600 fpm, the speed at X, the last point to solidify will be 570 fpm. The fluid pressure at the point X, due to the metal in the lumps, will then be, $.0000132 \quad (570)^2 \left(1 - \frac{22^2}{28.5^2}\right)$, or 1.73 psi. This is about equal to the pressure of gravity in a head 6-in. high, in a stationary mold. Obviously, such a lump cannot be expected to exert enough pressure to feed the rim very far around the periphery, and to secure a completely solid casting a number of them must be provided.

Exactly the same condition exists, of course, when the metal is poured through a central downgate and up through risers that connect with the lump heads. Then the pressure is never greater than that calculated for the above case, since only the heads produce pressure tending to force liquid steel into the rim. The necessity, under these conditions, of providing a number of these lumps to feed the casting may decrease the yield secured so seriously as to make


the new PREPARATOR
STREAMLINED, HEAVY DUTY, PORTABLE SAND CONDITIONER
Load centered trunnions on the Preparator provide perfect balance when moving the machine by crane to desired locations. The rigid construction of the frame assures normal operation of the machine even though it is placed on irregular or uncleared foundry floors.
The Preparator will do a complete job of preparing and tempering your molding sand! It thoroughly screens, breaks lumps, magnetically separates and aerates. Designed to best withstand the most severe conditions to which equipment of this type is often subjected. Heavy dust tight enclosures provide maximum protection to the operating mechanism.
SEND COUPON FOR NEW BULLETIN!

Beardsley & Piper are manufacturers of the Sandslinger • Speedslinger Hydra-Slinger • Speed-mullor • Mulbaro • Screena-rator • Junior Nite-Gang Preparator • Champion Speed-Draw • Plate Feeders Turntables • Gyratory Screens

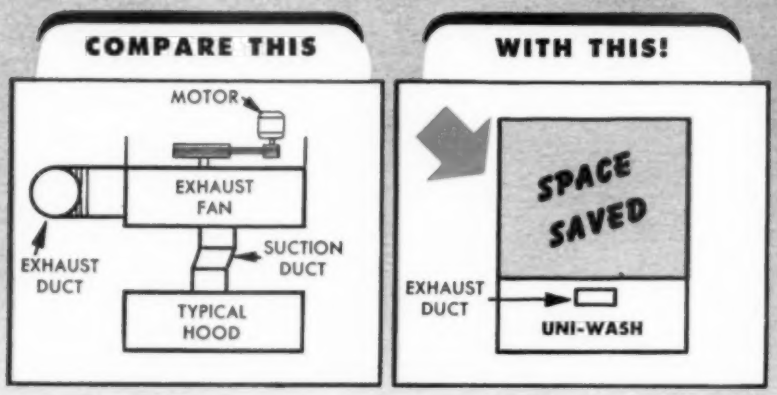
BEARDSLEY & PIPER
Division of Pettibone Mulliken Corp.
General Offices: 2424 North Cicero Ave.
Plant: 2541 North Keeler Ave.
Chicago 39, Illinois

☐ Send new Preparator Bulletin.
☐ Where may I see Preparator in operation?
☐ Have B&P representative call.

FOUNDRY _____
ATTENTION _____
TITLE _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

The UNI-WASH SHAKE-OUT BOOTH

OCCUPIES UP TO 75% LESS SPACE



THESE UNITS ARE SAME CAPACITY— DRAWN TO SAME SCALE

The floor plans above illustrate the space-saving design of the Uni-Wash Shake-Out Booth as compared with shake-out dust collectors of other makes. The Uni-Wash Shake-Out Booth collects, water-washes and drys, then exhausts dust laden air *within one compact unit.* No overhead equipment platforms to install and maintain, no suction ducts to install, clean or interfere with operations in the foundry . . . compact, complete, packaged dust collection.

Other Benefits

- Delivered 90% pre-assembled—factory tested prior to shipment. Connection of water and electrical services and discharge duct only installation operations necessary.
- 90% installation time and cost eliminated.
- 5 standard sizes—5000, 7500, 10,000, 12,500 and 15,000 CFM—used individually or in combination.
- Conveyor removes sludge automatically . . . reduced maintenance.
- Long, low cost service . . . only one moving part.
- Lower initial cost than any other system of comparable capacity.

Illustration at the right shows the neat, compact installation of the Uni-Wash Shake-Out Booth in a large foundry.

Send for Illustrated Catalog

Established 1912

NEWCOMB-DETROIT COMPANY

5741 Russell Street • Detroit 11, Michigan

the economy of the method, compared to static pouring, very small or non-existent.

In a spoke type or plate type gear blank, if the rim is thicker than the spokes or plate, the tendency is for some point in the latter, fairly near the rim, to solidify first. The junction of the spokes and rim, being rather heavier than either one alone, then tends to remain liquid longer than the rim, and hence to contribute its last remaining liquid metal to feed the contraction of the latter. The spokes or plate nearer the center of the casting having already solidified, the result is a shrinkage cavity in them at their outer ends which may even extend into the rim. If the spokes be made larger at the hub end, and tapering toward the rim, a source of fluid metal is provided to feed these cavities, and thus prevent them from forming, but the pressures tending to force this liquid metal through the earlier-solidifying narrow part of the spoke are insufficient to completely accomplish the desired result.

Method Not Satisfactory

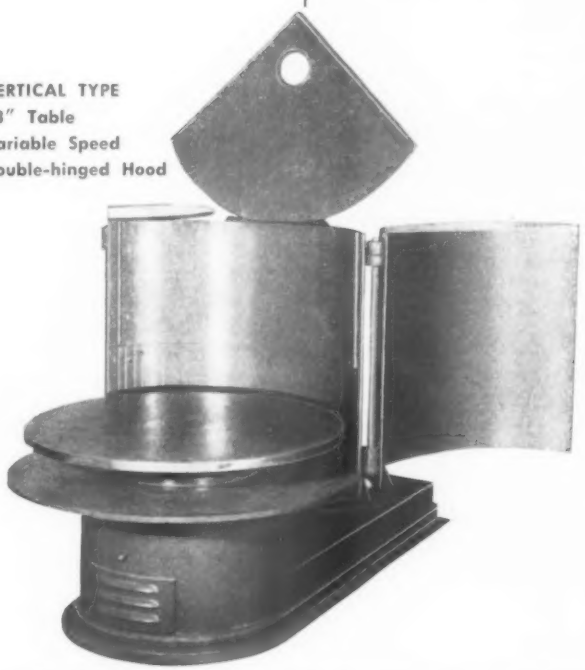
Thus in a 60-in. diameter blank, with a 3-in. thick rim, let us suppose the first-freezing point of the spokes is 2-in. from the inner face of the rim, or at a radius of 25 in. from the center the speed will be 500 fpm. As the mold is completely filled, the pressure due to centrifugal force at this point will be .0000132 (500^2), or 3.3 psi. Even when added to the pressure in the mold due to the weight of a head over the hub, and the atmospheric pressure, both of which continue to be effective as long as the top of the head is kept open, not enough pressure is exerted to overcome the stiffness of the frozen steel at the narrow point, and the available metal in the thicker part of the spoke will therefore be trapped where it is, and will not prevent the formation of the cavities.

The remedy for this condition, as Wright and Caine[6] point out, is to proportion rim, spokes or plate, and hub of gear blanks cast by this method, in such a way that directional solidification from the outside to the inside of the casting is established as nearly as possible. This is another way of saying that to secure complete soundness, the spokes or plate must be heavier than the rim, and the hub heavier than the spokes. Wright and Caine state that to prevent shrinkage at the ends of the spokes in gear blanks 24 in. in diam or under, the cross-sectional area of spokes and rim must be equal, but that the hollow place formed when

(*Continued on page* 186)

AIMES CENTRIFUGAL CASTING MACHINES

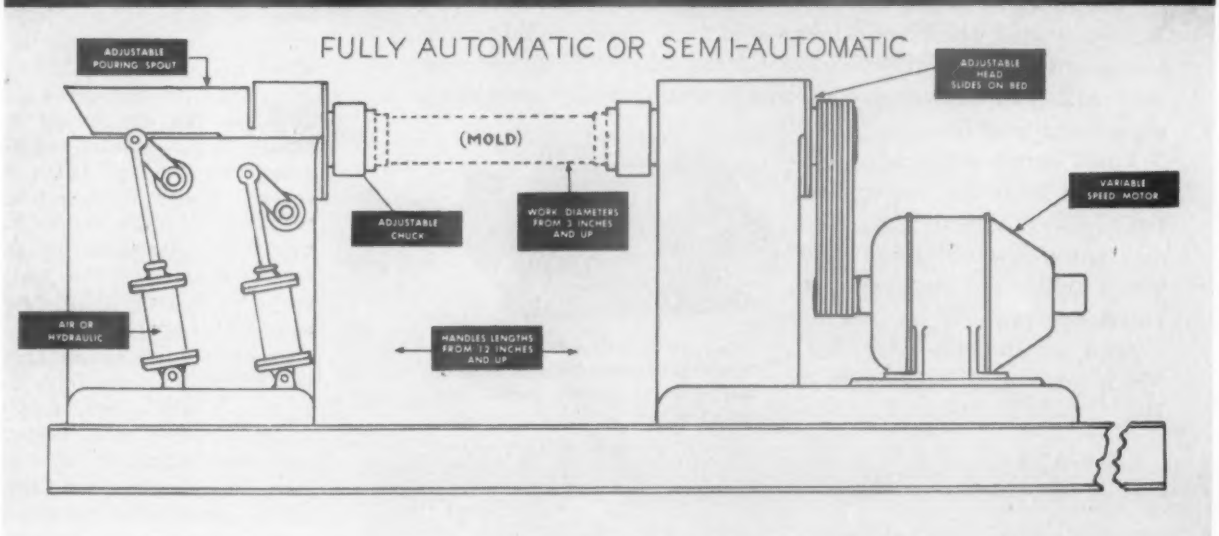
Built Exactly to Your Needs



VERTICAL TYPE
48″ Table
Variable Speed
Double-hinged Hood

Gray Iron, steel or nonferrous casting? Dry sand, green sand or permanent molds? Small jobbing shop or large production foundry? No matter what your requirements are, Aimes can supply the centrifugal casting machine best suited for your purpose. Vertical models with tables from 18″ to 60″ diameters in exactly the right combination of speed, power and range. Adjustable horizontal machines, as illustrated below, offer maximum production and versatility—furnished fully automatic or semi-automatic. Take advantage of Aimes' knowledge and experience—let them make a study of your specific problem and offer a solution. There's no obligation, write today.

ADJUSTABLE HORIZONTAL CASTING MACHINE



Designers and Builders

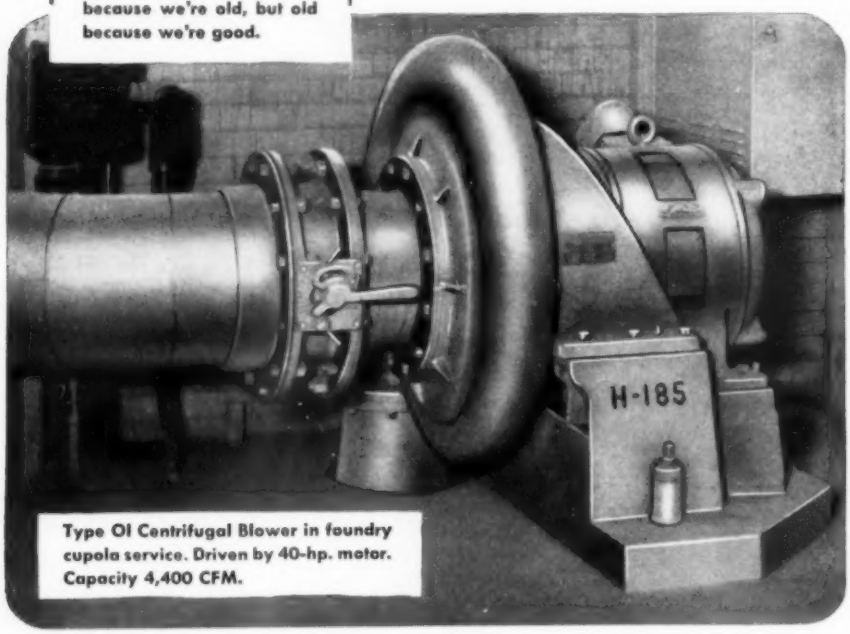
AIMES COMPANY, INC.

2424 EUCLID AVENUE **CLEVELAND 15, OHIO**

Oil was first produced by drilling in 1859, five years after the first Roots Blower was built. We're not good because we're old, but old because we're good.

NO "HEDGING" ON BLOWER QUESTIONS FROM

R-C dual-ability



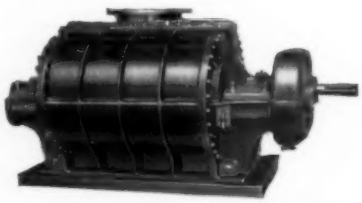
Type OI Centrifugal Blower in foundry cupola service. Driven by 40-hp. motor. Capacity 4,400 CFM.

When you ask Roots-Connersville sales engineers about blowers for foundry and cupola applications, you'll get unbiased answers, without "hedging" between Centrifugal and Rotary Positive equipment.

That's because of our *dual-ability* to design and build both types. We recommend whichever is best suited to the specific application, and we are the only blower builders that can offer you this important *dual choice* . . . an exclusive advantage which usually saves time, money and trouble.

You'll obtain outstanding performance from R-C equipment, too . . . the result of 94 years of experience, plus initiative and advance thinking of alert engineers and designers.

Send for Bulletin 120-23-B-11, which gives complete details on R-C Cupola Blowers.



This Type RCS Rotary Positive Blower is typical of the wide range of sizes available for foundry cupola applications.

ROOTS-CONNERSVILLE BLOWER CORPORATION
810 Madison Avenue • Connersville, Indiana

ROOTS-CONNERSVILLE ROTARY CENTRIFUGAL

BLOWER BUILDERS R-C SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

• • ONE OF THE DRESSER INDUSTRIES • •

(*Continued from page* 184)

the rim is heavier than the spokes will not extend into the rim itself if the ratio of cross-sectional area of rim to that of spokes does not exceed 1.2 to 1. They state also that if the length of spokes between the outer face of the hub and the inside of the rim is between 4 and 15 in., sound castings can be secured by tapering the spokes ¼ in. per ft. The author's experience with castings of somewhat larger diameter has not confirmed this finding, even heavily tapered spokes being unsound where they joined the rim. Wright and Caine also recommend that the distance between spokes should not exceed 10 times the thickness of the rim plus 10. In the author's experience with larger pieces, this would be too liberal a distance.

Wright and Caine's final recommendation is that blanks over 5 ft in diameter should not be attempted, because they would require such heavy spokes as to make them entirely too clumsy. The author would even draw the line at a lower diameter, having found it impossible to secure radiographically sound spoke or plate type blanks of approximately 48 in. dia, except by using a plate thickness far greater than would be indicated by Wright and Caine's figures.

Hollows in Heavy Sections

How serious the shrinkage areas in these castings may be depends entirely upon the stresses that are to be set up in the spokes in service. As Wright and Caine and others have pointed out, the hollows normally occur in the heavier sections where the spokes are filleted to meet the rims, and the sound metal surrounding the shrinks at this point usually has a greater cross-sectional area than that of the rest of the spoke. Under these circumstances, the strength of the casting as a whole would be measured by the cross-sectional area of the body of the spoke, so that the slight cavity would be of little importance.

Stress concentrations at such hollow places, however, may sometimes be severe, and a safe rule would be to make radiographs of enough gears cast centrifugally from a given pattern to establish the size of the shrinkage areas to be expected. The performance of the casting in service can then be predicted with a fair degree of confidence. As a rule, in gear blanks designed especially for this method of manufacture, the part of the rim in which the teeth are cut will be completely sound, so that the strength of the teeth will not

(*Continued on page* 188)

Remove more metal at less cost

with CP Super Cycle Grinders

Latest CP development in electric tools — the CP Super Cycle — has lowest ratio of weight to horsepower ever built into a portable tool.

CP Super Cycle Grinders are easier to handle, can be located on work more quickly, and are less tiring to hold. Speed does not sag when operator bears down, as tool works at full speed under all loads.

Motor, operating on 360 cycle, 3-phase, 220 volt current, is of squirrel cage induction type. Maintenance is remarkably low, since there are no brushes to replace nor armatures to burn out.

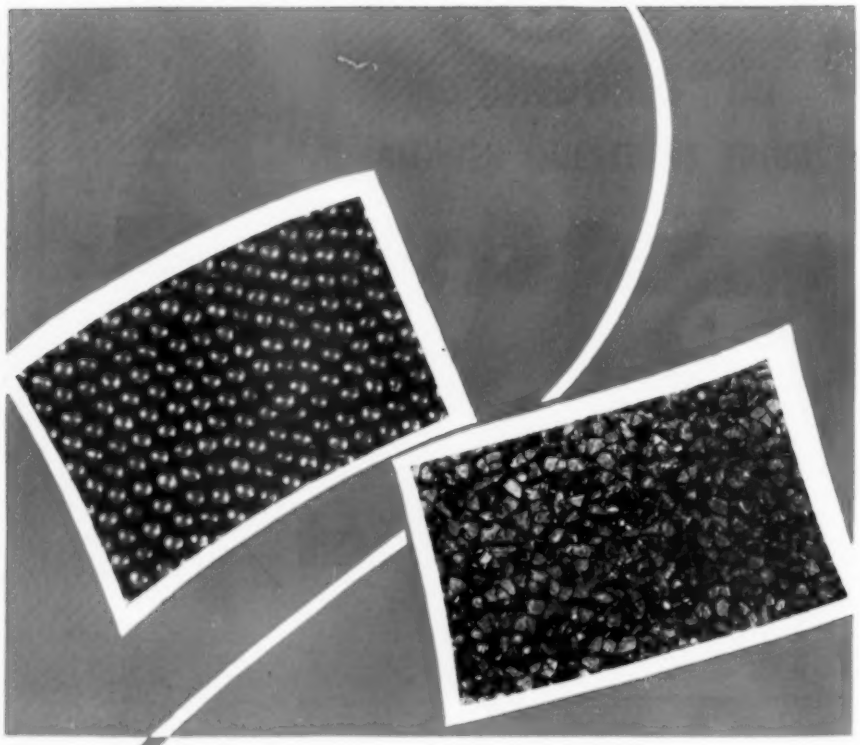
The complete line of Super Cycle tools includes grinders, sanders, polishers, buffers, screw drivers, drills, nut runners, tappers, in a wide range of speeds.

Write for full information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

ELECTRIC TOOLS • PNEUMATIC TOOLS • AIR COMPRESSORS • ROCK DRILLS
DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Look Again...
HAVE YOU EVER SEEN GREATER
Uniformity?

In 20th Century Blast Shot and Grit uniformity and durability team up to give you the most effective and economical blast cleaning abrasive. Scientific heat treating process gives the right temper for every need.

IMMEDIATE SHIPMENT

20th CENTURY BLAST

SHOT · GRIT

THE CLEVELAND METAL ABRASIVE CO.
Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio
Howell Works—Howell, Michigan

(*Continued from page* 186)

be reduced by concealed cavities or sand spots, as occasionally happens in gears cast by conventional methods on which heads are used that are too small to ensure perfect feeding.

The solidification of heavy masses of steel in sand molds is necessarily slow and in semi-centrifugal work, just as in true centrifugal pouring, there is little if any motion of the steel relative to the mold. Therefore, steel and mold, although revolving at considerable speed, are actually static relative to each other, just as objects upon the earth's surface, though actually revolving at a terrific rate, are static with reference to the earth. Dendrites, therefore, form in the steel, exactly as they do in regular foundry practice, starting from all cooling surfaces and extending into the casting at right angles to those surfaces. In some cases these dendrites may be several inches long. In a plate type gear blank, they usually extend from all sides of the rim toward its center, and from the faces of the plate and hub toward the interior. Where the ends of these dendrites meet, there are microshrinkages of larger or smaller size, depending upon a number of factors such as the temperature of the steel when poured, the thickness of the sections of the casting, and so on.

Free from Discontinuities

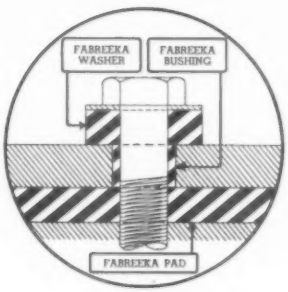
As a rule, the rim of a heavy gear blank spun at proper speed and so designed as to give good directional solidification, is fairly free from these discontinuities. The plate, however, especially if it is comparatively thick, will contain a number of them, and as a rule they will be more numerous in the part near the hub than in the outer portions. They are usually too small to be visible on a finish-machined surface, but acid etching or magnetic powder examination of a section of the casting will reveal their presence. Test pieces cut from the rim of a casting of this sort will usually give properties that compare favorably with those of bars machined from coupons of the usual type. The same will be true of tests cut from the plate and hub, except when the test piece happens to have a microshrink in it. Then, the elongation and reduction of area obtained are much lower than those of the pieces cut from the rim.

Such minute defects normally will pass undetected, and they probably affect the usefulness of the casting little if at all. However, in exceptionally severe service they may lead to

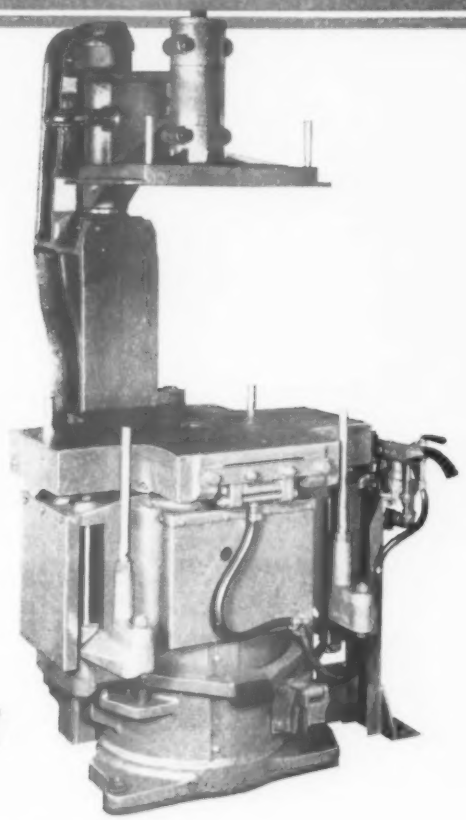
(*Continued on page* 190)

for IMPACT SHOCK and VIBRATION

Under Jolt Moulding Machines



SHOWN AT LEFT
CROSS SECTION OF FABREEKA INSTALLATION



REDUCE MAINTENANCE AND IMPROVE PRODUCTION *with*

FABREEKA

FABREEKA Pads, bushings, and washers are installed under Jolt Moulders, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production.

In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.

Write for latest literature

It Pays to Specify Fabreeka

FABREEKA PRODUCTS COMPANY INCORPORATED
222B SUMMER STREET BOSTON 10, MASSACHUSETTS

MANHATTAN Abrasive Wheels
For Heavy High-Speed GRINDING

Custom engineered for your job, Manhattan Abrasive Wheels cut cost and speed production on all grinding operations.

Exclusive Manhattan developments in both Rubber and Resinoid Bonding assure you production economies of fast metal removal with long wheel life.

Ask to have a Manhattan Field Engineer call at your plant. His suggestions may well mean more production—faster—at less cost. There is no obligation.

ABRASIVE WHEEL DEPARTMENT

RAYBESTOS-MANHATTAN INC.
Keep Ahead with Manhattan
MANHATTAN RUBBER DIVISION PASSAIC, NEW JERSEY

(*Continued from page* 188)

failure of the part. Heavy disks revolving at tremendous speeds, for instance, such as those used in gyroscopes and the rotors of certain types of turbines, are subjected to stresses so high that the presence of discontinuities, even minute ones, might very well lead to disastrous failures. Some means of preventing the formation of these defects would greatly extend the usefulness of the semi-centrifugal as well as the true centrifugal method of producing castings.

Equipment required for semi-centrifugal work is quite simple, involving merely a number of machines with horizontal face plates of sufficient size to accommodate the flasks or core assemblies used. The latter are as a rule bolted down to the face plates with simple clamps, though light circular flasks that are in fairly good balance are sometimes merely set on the table of the machine and driven by means of a pin in the latter which engages a cross member on the bottom of the drag flask. To guard against run-outs, which naturally convert the machine into a fiery pin-wheel, there should be either a steel shield around the whole assembly and covering most of the top, or the machines should be set in pits, covered by removable plates, with the tops of the molds a little above the level of the floor.

Can Use Square Flasks

Flasks preferably should be round, but square ones can be used when the rate of rotation is not too high. One precaution to be taken when the steel is poured directly into a head is to have the sides of the head near the top slope inward, instead of being straight-sided. This is necessary to keep the metal from rising over the tops of the heads from centrifugal force, since obviously it tends to creep up the heads just as it does in cylinders poured by the true centrifugal method in vertical molds. If the steel is allowed to run out over the tops of the heads, it of course flows over the upper surface of the mold, and is then scattered in showers in every direction. With heads whose tops taper inward, this cannot occur.

Aside from the direct saving due to increased yield there is an advantage in using the semi-centrifugal method in that, as a rule, only one head has to be burned from the casting, and no trimming of head pads on the rims is required. The possible saving in burning and chipping costs, however, is no longer as great as it was even five years ago, because in regular foundry work it has become

(*Continued on page* 192)

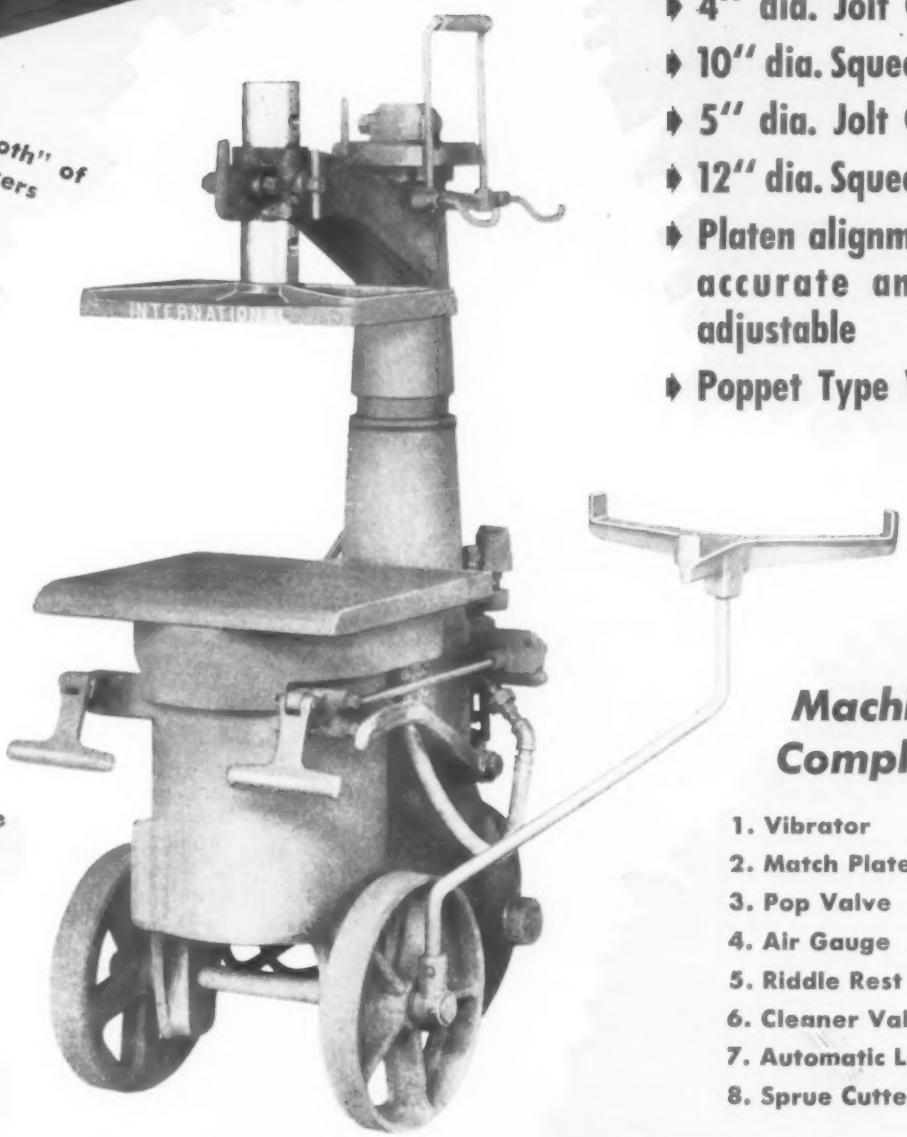
Immediate Delivery!

INTERNATIONAL

TYPE LJS JOLT SQUEEZERS

- Portable or Stationary
- 4" dia. Jolt Cylinder
- 10" dia. Squeeze Cylinder
- 5" dia. Jolt Cylinder
- 12" dia. Squeeze Cylinder
- Platen alignment always accurate and quickly adjustable
- Poppet Type Valves

The "Behemoth" of Jolt Squeezers



Low Maintenance Cost

Machine Sold Complete with

1. Vibrator
2. Match Plate Holder
3. Pop Valve
4. Air Gauge
5. Riddle Rest
6. Cleaner Valve
7. Automatic Lubrication
8. Sprue Cutter Holder

Long-lasting because of Sturdy Construction - extra heavy weight

INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS • (Suburb of Chicago)

THIS ONE IS ON THE HOUSE

We believe the best way to test the claims of any advertiser is to test the products yourself. So if you will please fill out the attached form, we will be glad to send you samples of the products you care to check.

CHECK HERE

"SUPERFLAKE" FOUNDRY PRODUCTS

	MOLDUKO CORE & MOLD WASH Will ship **10 Gals. of Molduko & 25 lbs. of Filler** at full drum prices for test purposes.
	HYDRO GRAPHITE ***(It's New!)*** Excellent permanent mold wash.
	CARBON-RAISER (Add to the metal in the ladle, at the spout, in the furnace or in the cold charge) **IRON FOUNDRIES** use to control depth of chill and improve the machineability of the castings. **STEEL FOUNDRIES** use to control carbon content, in the ladle and in the furnace quickly, accurately and efficiently.
	PARTING Non Silica or Tripoli, Highest Quality
	PIPE REDUCER Used on "Gates" and "Risers" in Steel & Iron foundries.
	PLUMBAGO & CORE WASHES In both Dry and Paste forms.
	LADLE WASH
	MUDDING COMPOUNDS
	CORE PASTES Strong bond, Dry quickly.

Please send me samples and further information on the products checked above.

Name ..... *Title* .....

Address .....

Company .....

SUPERFLAKE GRAPHITE PRODUCTS

SUPERIOR FLAKE GRAPHITE COMPANY

Manufacturers of mold and core washes, facings, parting compounds, core paste, carbon-raiser.

TELEPHONE: RANDOLPH 7939

33 So. Clark Street *Chicago (3) Ill.*

(*Continued from page* 190)

standard practice in many cases to use side-attached, necked-down heads on the rims of gear blanks. The cost of grinding down the small stubs remaining after these heads have been knocked off is not high, and may very well be a smaller item than the cost of operating the spinning machines. This is particularly true of heavier castings because they solidify so slowly that each machine can be used but once on a furnace heat, and therefore, enough machines must be provided to handle all the castings that are to be spun at any one time. The cost of operating such a battery of machines may offset any economies due to greater yield and diminished cleaning room costs.

Use Stacked Molds

When a number of small wheels or gear blanks can be poured on one machine, using stacked molds or cores, the method appears more attractive. In the case of annular castings such as sprocket rims, which require lump heads distributed about the inside edge to prevent the formation of shrinkage cavities, it is by no means certain that spinning is more economical than static pouring. In the first place, it is perfectly possible to pour the core stacks without spinning them, consequently the centrifugal method does not necessarily produce more castings in a given space than static practice.

Moreover, as shown previously, the pressures due to centrifugal force in the case of these lumps is not very high. Frequently, therefore, better feeding may be secured by pouring the core stack without spinning, and using somewhat higher heads, connected to the casting through neck-down cores. If the metal is carried to the castings direct from the center downgate, instead of from riser-gates fed from the latter, it is possible to carry each head to the necessary height in the stack of cores and thus secure adequate feeding without the necessity of resorting to centrifugal methods.

In certain cases where mass production of a single casting was possible, special riggings have been designed and used that combine the functions of metal molds and core-supporting frameworks. Such a casting is shown in Fig. 21 and the mold and core assembly used to produce it in Fig. 20, both from an article by Blackwood and Perkins.[9] In this case the metal mold is split vertically, and when closed the half molds are located properly with reference to each other by pins and bushed holes. Two hollow cores, made in halves

(*Continued on page* 194)

High Temperature Lubrication...400°F. and up!

Lubrication of kiln-car wheels proved a headache to a large manufacturer of ceramic bodies for spark plugs. Heavy oil carbonized, freezing the wheels; powdered graphite was unsuccessful, too. The cure was **"dag"** colloidal graphite dispersed in kerosene.

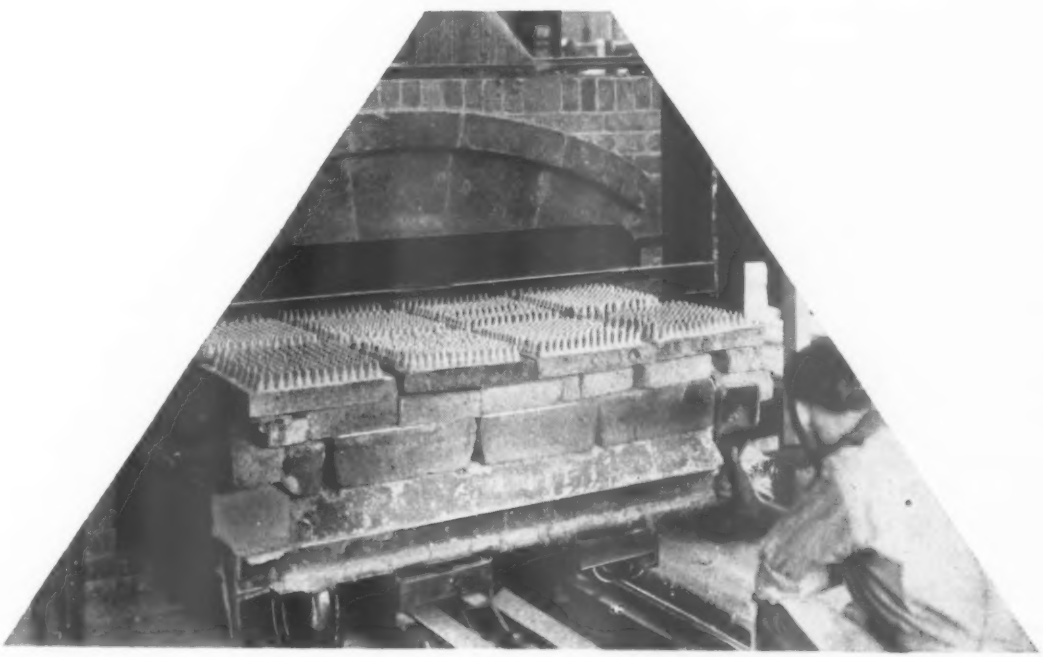
Wherever lubrication at high temperatures is a problem, one of the **"dag"** colloidal graphite dispersions is a possible solution. Let Acheson Colloids engineers help you...all you have to do is ask.

"dag" colloidal graphite dispersions are also successfully used for opaquing, parting, impregnating, general lubrication and electronics work.

Clip and mail the coupon **NOW** for more information.

Acheson Colloids Corporation, Port Huron, Michigan; Boston; New York; Philadelphia; Pittsburgh; Cleveland; Detroit; Chicago; St. Louis; Los Angeles; San Francisco; Toronto.

dag
REG. U.S. PAT. OFF.
COLLOIDS



Send us information on "dag" colloidal graphite dispersions for:

Extreme (high or low) temperature lubrication ☐
General lubrication ☐ Impregnating ☐
Parting ☐ Opaquing ☐ Electronic applications ☐

KK14

40th ANNIVERSARY YEAR

Acheson Colloids Corporation Port Huron, Michigan

MATERIAL HANDLING *News*

Reelected!-- by a ROUSING MAJORITY: the CLARK ELEC-CARLOADER!

Campaigning squarely on its record for versatile usefulness and exceptionally low cost, the Clark Elec-Carloader has been enthusiastically endorsed by World Industry as the outstanding materials handling machine of its kind.

More efficient storage and huge savings of time are obvious benefits of the Clark Method.

The preference it enjoys is a tribute to the Elec-Carloader's usefulness in Industry's program of increasing productive capacity within existing facilities; of accelerating output by speeding the flow of materials through processing, warehousing and transit; and of realizing vast potential savings.

The Elec-Carloader, with its 4000-lb. capacity, is a particularly effective combination of the famous Clark Carloader —outnumbering any other model of fork lift truck manufactured! — and electric battery power, as developed by Clark. Bred into it are Clark's mass production of component parts and of complete machines; Clark's maximum interchangeability of parts; and Clark's unparalleled automotive and materials handling experience.

To get the facts about the Elec-Carloader is to understand the beneficent revolution that is taking place in

Speed is the money-saving Clark keynote—in storing materials, in getting them out again.

Industry's handling of materials. They are facts worth knowing, and are readily obtainable from a man worth knowing: a Clark field representative. It's a boon to any business to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 16, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

THE NATIONAL GUARD DEFENDS AMERICA—JOIN NOW

(*Continued from page* 192)

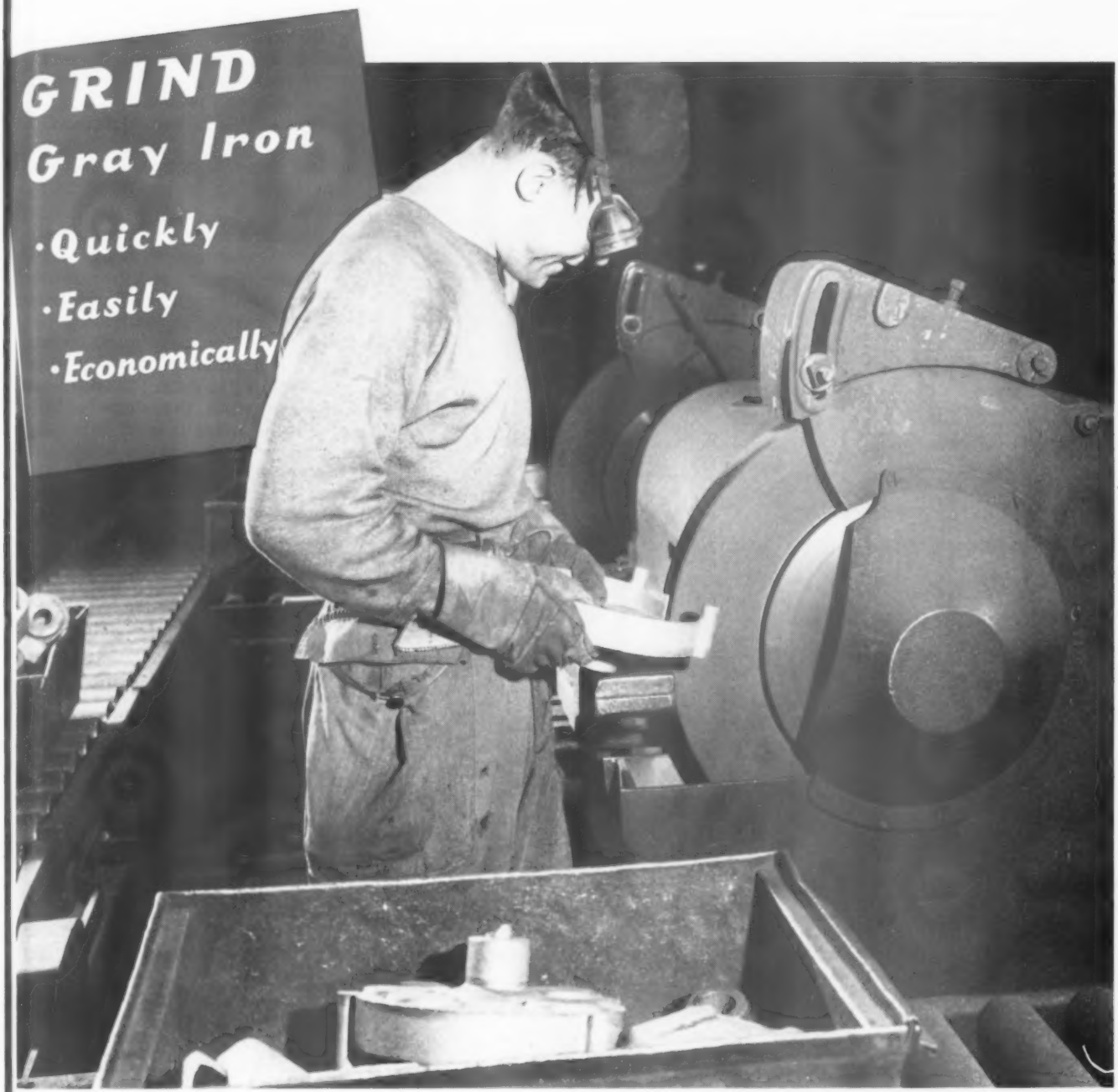
and pasted together are set in the mold. One of these serves as a combined gate and head, and at the same time shapes the inside of the lower part of the casting. The other, shown as a "splash core" in the illustration forms part of the outer face of the casting, and also acts to protect the metal of the mold from the cutting action of the hot steel as it enters the mold. For pouring, the assembled mold is lowered into a pot that fits its outer surface and is attached to the table of the spinning machine. Because of the joint in mold and cores, the mold in this case was rotated at only 167 rpm, which gives rather a low peripheral velocity, even for semi-centrifugal work. In making this particular job, a number of spinners were used suitably mounted around the periphery of a slowly rotating turn-table.

Centrifuging—This term has been somewhat loosely used to cover both semi-centrifugal pouring, either before spinning is started or while the mold is rotating, and the pouring of molds in which a number of identical or closely similar castings are grouped about a central downgate, which feeds steel to the several castings through a number of gates. In this article, the term is restricted to the latter process.

In centrifuging as thus defined, the castings are not spun about their own axes but are arranged symmetrically around a central downgate so that the system as a whole is in balance. Pieces of a wide varieties of shapes can be produced by this method. To put the greatest possible number of castings into one assembly, it is frequently desirable to use slab cores instead of molds and to stack them as high as the location of the pouring machines permits. The sprues for each casting commonly extend direct from the central downgate. To ensure that the lower castings in the stack are filled before any steel can run into the upper ones, the sprues should extend upward and then outward, as in Figs. 20 and 23 taken from an article by Blackwood and Perkins[8] which illustrate the method used to make the cores for a stack of 144 castings. From the same source Figs. 25, 26 and 27 illustrate the use of the method for the production of other small parts.

The machines used to revolve the molds and the rates of spinning are identical with those used in semi-centrifugal pouring. The same considerations—lack of perfect balance and the danger of run-outs at the horizontal joints—or even of burst-

(*Continued on page* 196)



Use CRYSTOLON Wheels on Your Floor Stands, Swing Frames, and Portables!

CRYSTOLON wheels from 6" to 24" in diameter for floor stands—with vitrified bond for speeds up to 6500 s.f.p.m., and with resinoid bond for high speeds—enable you to grind castings of gray iron or malleable iron quickly, easily, and economically. They remove stock rapidly—break down slowly—require less dressing—and cut clean without objectionable "bounce"!

CRYSTOLON wheels give you similar results on your swing frames. And small CRYSTOLON wheels for your portables have the same cost-cutting features as larger Norton wheels, and are backed by the same extensive research, manufacturing and engineering facilities of Norton Company—the world's largest producer of abrasives and grinding wheels.

NORTON COMPANY • **WORCESTER 6, MASS.**

Distributors In All Principal Cities

W-1200

NORTON ABRASIVES

COMBS GYRATORY FOUNDRY RIDDLES ARE NOW DELIVERED PROMPTLY . . . . . .

This is type CR. Priced at—$280. F.O.B. Leavenworth . . . Saves hours, saves men, saves sand . . . and most important, it saves money for users!

This is type CS, $290. complete, F.O.B. Leavenworth. Combs equipment is available to you in foundry supply houses everywhere. Information on request.

Extra screens represent a wise investment. Our screens have rims of heavy steel, and there is a style for every Combs unit.

Great Western
Manufacturing Company
LEAVENWORTH, KANSAS

(*Continued from page* 194)

ing the molds apart when core assemblies are used, prevent the adoption of really high rates of rotation. As a result, the pressures set up in the fluid steel are not high, and it is no more possible to feed heavy sections through light ones than it is in static or in semi-centrifugal pouring.

It should not be expected, therefore, that castings will be radiographically sound if the sprues through which they are fed are smaller than the castings themselves, and examination of castings made by this method has often shown that they are not perfectly solid. This is even more true when the shape of the pieces being made is such that they must be set in the molds with their heavier portions further from the source of metal than the lighter parts. Then the latter often will be seriously unsound, because the earlier freezing of the lighter parts cuts the heavier portions off from any source of fluid metal to feed the contraction that occurs when the metal freezes.

Must Consider Location

In many cases, the shrunken or spongy places resulting from the above-described conditions are of little if any importance; the function of the casting being such that if it is solid in certain vital parts, the other portions need not be perfect. That all of the castings made by this method, and shown in the accompanying illustrations, were sound enough for the uses for which they were intended, was proved by the fact that they were produced by the thousand, and proved perfectly satisfactory in service.

When the service in which the piece is applied is such as to require completely solid metal, the only way to secure the desired conditions is to proportion the casting itself, and the sprues that carry the steel into it, in such a way that directional solidification will take place, and the sprue or an enlargement of it close to the casting will remain fluid long enough to feed the contraction of the last part to freeze. Such conditions can by no means always be secured in mounting castings for centrifuging, so that in many of the parts made by the method, as stated previously, a certain amount of unsoundness is unavoidable.

A considerable number of castings of much larger size than those made in assemblies of stacked cores, have been produced by centrifuging. Some of these were made in large cores set together in pairs, mounted in a

(*Concluded on page* 198)

Announcing—

. . . . A NEW TECHNICAL SERVICE TO FOUNDRY SAND USERS

We are in business to sell tonnages of sand and we realize that our success depends on the results you obtain. We place our sand specialists at your disposal to help you correct difficulties which may have arisen through the use of sands not suited to your particular requirements. We specialize in semi-synthetic and synthetic sands for core room and molding practice and are able to supply you with the proper sand for your needs.

AMERICAN SILICA SANDS

The American Silica Sand Company has served the foundry industry exclusively for thirty years and production at our Ottawa district pits enables us to give you prompt delivery *at any time*.

We invite your attention to the accompanying coupon. There is no obligation on your part. Give us the opportunity to cooperate with you on your sand problems.

THE AMERICAN SILICA SAND COMPANY

Producers of Dried and Crude Silica Sands

OTTAWA, ILLINOIS

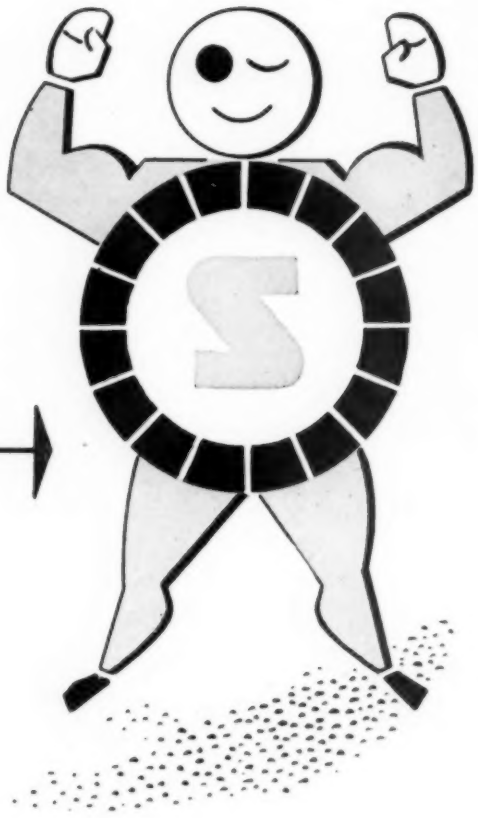
We Invite Your Inquiry

The American Silica Sand Company
Attention: Fred G. Kramer, Technical Adviser
Central Life Bldg., Ottawa, Ill.

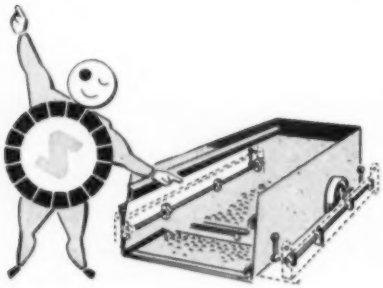
Okay, please DO have one of your sand technicians call on us in the near future. We are especially interested in
( ) Core Room Sands ( ) Molding Sands

Name ..... *Title* .....

Company ..... *Address* .....



Let
SECO
solve your
vibrating
screen
problem

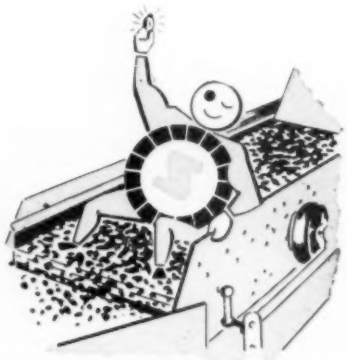


GET THIS EXCLUSIVE
FULLY CONTROLLED TRUE
CIRCULAR ACTION

In reclaiming foundry sand you'll benefit by Seco's smooth, trouble-free performance. Seco's patented equalizer assembly (in outline) controls the action of the screen body with resultant true circular action under all load conditions.

FOR BETTER,
CLEANER SAND

The smooth action of a Seco keeps the load moving, reduces blinding and plugging of the meshes and by so doing improves efficiency. Thousands of enthusiastic Seco users coast to coast have proven this. There's a right Seco for your screening job, too!



Write Dept. O for A Guide to Better Screening

SECO

SCREEN EQUIPMENT COMPANY, INC.
PRODUCERS OF VIBRATING SCREENS EXCLUSIVELY
Buffalo 21, New York
In Canada: United Steel Corp., Ltd., Toronto

(*Concluded from page* 196)

vertical position, and held in rigid frames attached to a central shaft on the machine. The latter contained the tile brick used for the down-gate, and sprues were taken from it to feed the steel to the mold cavities. In this way, castings of fairly large size have been produced. Because it was not feasible to make the sprues carrying the steel into the molds large enough to remain fluid as long as the castings, it was found necessary to place lump heads on the latter at such locations as to best feed the fluid contraction, counting upon the pressure due to centrifugal force to feed this metal to the last solidifying point.

Of course, in this case the pressures set up are those calculated from the formula Pressure = $.0000132\ S^2 (1 - \frac{R_1^2}{R^2})$, because very soon after pouring ceases, the sprues freeze off and the conditions are those of a partly full mold. Since R_1, the distance from the center of rotation to the inside of the lump head is necessarily not much less than R—the distance from the center of rotation to the last freezing point in the casting—the expression $1 - \frac{R_1^2}{R^2}$ is generally not far from 0.5, so that the pressures at the usual speeds of rotation are not over some 2½ psi. This is approximately the same pressure as is produced in static practice by heads 9-in. high. In many cases, therefore, it would appear to be cheaper to pour the castings by regular foundry methods, using necked-down heads perhaps 10 or 12 in. high, which are knocked off the castings, leaving stubs that can be quite cheaply ground or chipped off. Thus it appears probable that in the production of larger pieces, centrifuging generally offers little if any economy over regular foundry practice.

References

6.—W. F. Wright and J. B. Caine—"Centrifuging After the Mold Is Filled with Steel," THE FOUNDRY, May 1943, p. 91. Note: The term "centrifuging" employed in this title is not used in the same sense as that employed by the present author.
7. C. K. Donoho—"Casts Steel Centrifugally," THE FOUNDRY, April 1943, p. 130.
8. E. C. Jeter—"Improvements in Pressure Ferrous Castings Influencing Their Future Use," *American Foundryman*, December 1944, p. 5.
9. Peter Blackwood and John Perkins—"Centrifugal Castings," *Transactions*, AFS, Vol. 52, 1944, p. 273.
10. Anton Johnson—"Steel Sheaves Are Cast Centrifugally," THE FOUNDRY, June 1943, p. 139.

Coventry Metal Castings Inc., Akron, O., has been formed by R. B. Piazza, E. M. Starr and Robert S. Pflueger, 329 Second National Bldg.

Sterling

Vitrified and Resinoid Snagging Wheels for Extra Hours of Better, Faster Grinding

To obtain higher production and, at the same time, lower snagging costs, more and more workers and foremen find Sterling Snagging Wheels are by far the best obtainable. Careful attention to the small details of your job results in better than ordinary wheels—faster-cutting ones, too!

Under some conditions, vitrified wheels, running between 5500 and 6500 surface feet per minute are most suitable. Other jobs demand resinoid wheels operating between 9000 and 9500 surface feet per minute. The determining factor can be obtained by consultation with a Sterling engineer.

Skilled by years of experience on hundreds of different snagging jobs, the Sterling engineer can give valuable advice regarding the proper "Wheel of Industry" to use. In addition, the services of our laboratory technicians and plant engineers are yours to assist in selecting the "wheel in a thousand" your particular job needs.

May we serve you?

• The Sterling Selector gives suggested specifications for the many types of grinding. Send for it!

THE ADVENTURES OF *Bill*

By PAT DWYER

Drawings by RICHEY

WHEN I was a young lad," Bill said, "I worked in a shop that handled a good bit of mining machinery. Mostly for coal mines. Complete power plants for new mines and repairs for those already in existence. Several times each year we furnished machinery, engines, boilers and stamp mills for gold mines scattered here and there, usually in the wildest and most desolate territory. When and if a proper history is written, perhaps full credit will be given to the modern descendants of Paul Bunyan, who by superhuman effort dragged the great, heavy loads through forest and swamp from tide water to mine.

Two men spent nearly all their time making the steel spoke sheaves over which the cables ran while lifting the loaded cars from the coal strata level to the surface. These wheels varied in diameter from 5 to 15 ft; and although I have rambled around quite a bit, I never have seen a better method for making these green sand molds, a higher degree of skill by any molders, or better looking castings. The fact that I was pressed into service now and again on this job while one member of the team was absent and most probably sleeping off the effect of too large a dose of strong water, may or may not have had a bearing on the above opinion."

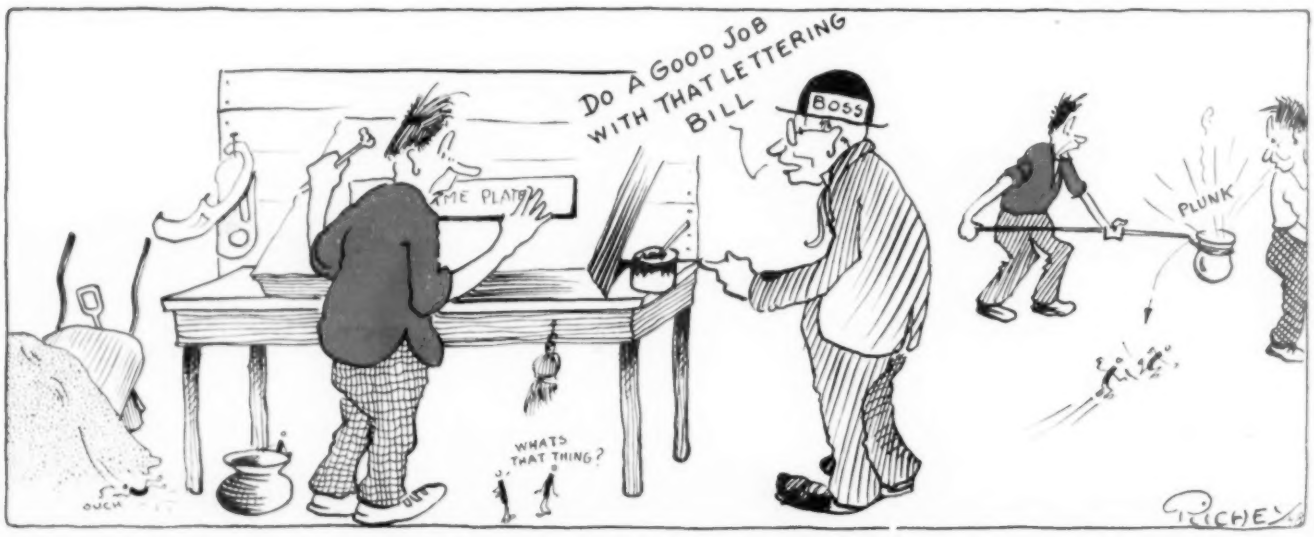
"I hope," I said, "you are not going to inflict a description on me. I have seen several methods for making these wheels. In fact if necessary, I can show you a few pictures in an old scrap book, in which I am shown leaning nonchalantly against a large specimen. One time I got up a rig for holding the central hub cores truly in the center while pouring the hub on the second day—."

"As you were," Bill interrupted. "I have heard so many men claiming this distinction I am greatly pleased to meet the original, blown-in-the-bottle, genuine inventor. A certain incident which turned up while cruising the Great Lakes a couple of months ago, brought to mind an incident of the long ago when I worked 10 hours a day, six days a week and considered myself well paid when the combined paymaster, foundry clerk, salesman, shipping clerk and time keeper handed me $24 every second Saturday at quitting time. Times certainly have changed. Today, nearly everyone is convinced that a man's health will be injured permanently, that he will be crippled and a charge on the community, if he is forced to work more than five 8-hour days per week, and at a wage that ranges from $12 to $18 per day for five days and according to current rumor up to $36 for Sunday. Only the most hard-hearted employer can quarrel with the claim that a man who deliberately places his health in jeopardy is entitled to enhanced compensation. To quote my old uncle Malachi 'There were great min in thim days!'

"On one occasion a famous engine building company found it necessary to sublet some of the orders on its books. The firm I was with was given the order for two complete twin haulage engines, right and left. Nearly all the castings were made in dry sand molds. Men on the job were cautioned to go the limit in producing a set of castings with a piano finish. The president of the company, a very important individual indeed, only rarely seen by humble toilers in the shops, stopped by one day to see how the work was coming along. My particular job at the time was tapping a flat piece of wood into a flat face on the mold. The flat piece of wood had the name of our firm and the address in letters 4 or 5 in. high. For many years this little trick has been done by ramming a flat core up with the pattern, but in this particular instance it was done with the small flat board. The great man favored me with a paternal smile. 'Do a good job with that, Bill,' said he. 'These engines are going to a distant country and we want to create a good impression.'

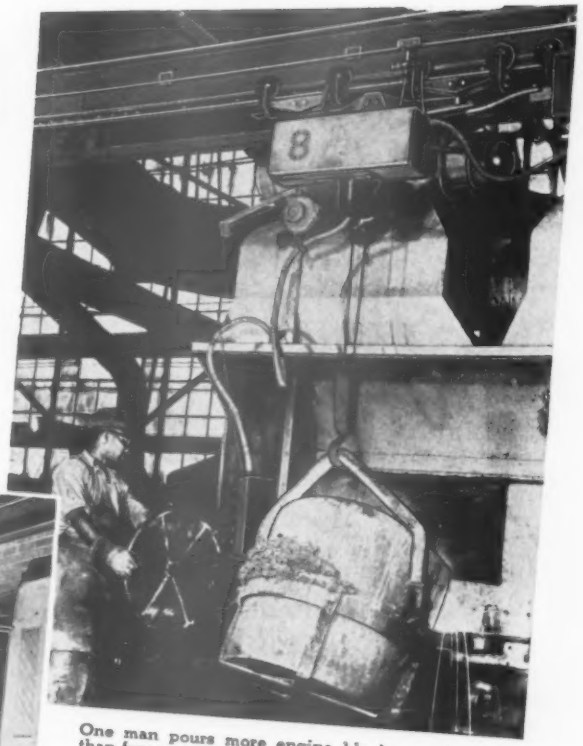
"The first engine was machined and assembled and set up for a test with the steam. The inspector from the outside firm was quite pleased with the performance, but he objected to the firm name. He insisted on having a man with a chisel go over and remove every trace. Then he took from his pocket a small brass plate with his firm's name and address, and had that attached.

(*Continued on page* 202)

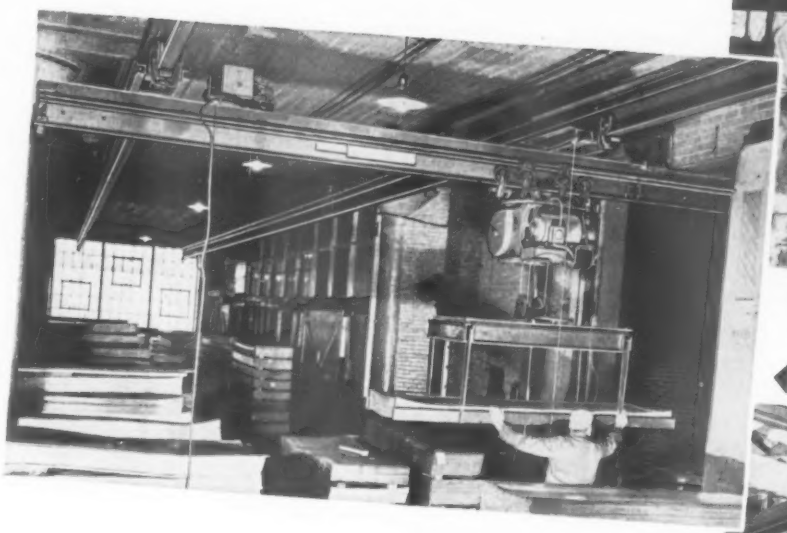


The boy shows the proper degree of affection and attention to the kind words of his superior

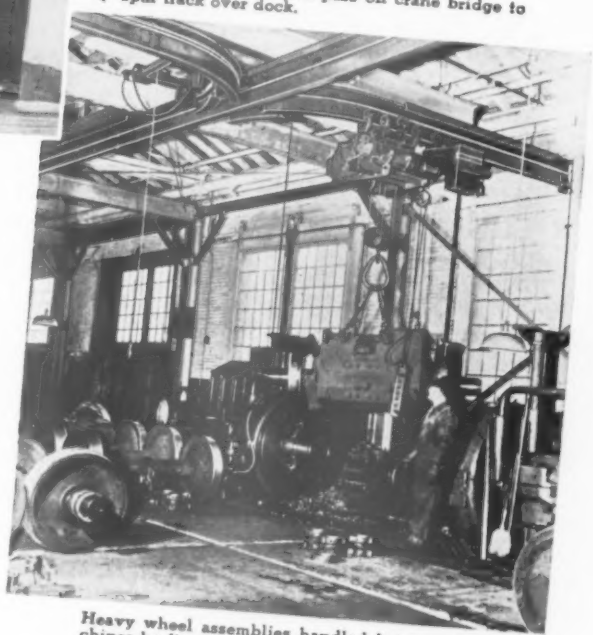
HEAVY LOADS GO "Up and Over" with finger tip control



One man pours more engine blocks per hour than former crew of three.



Two ton loads of steel pass off crane bridge to spur track over dock.



Heavy wheel assemblies handled between machines by finger-tip control.

American MonoTractors do the hard jobs the easy way. They perform automatic "Up and Over"* handling operations with extreme accuracy and reliability. Finger-tip control assures accurate movement and spotting of the load. "Up and Over" machinery and equipment means no damage to machines or materials and no congestion in the operating area. More important, they eliminate back-breaking labor. The hazard of bad strains and hernia is gone.

In short, American MonoRail Overhead Handling Equipment increases production, saves labor, saves time and cuts costs. American MonoRail engineers will gladly show you that automatic handling pays and saves.

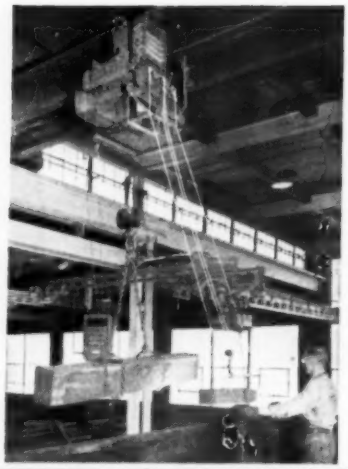
Free MOVIE

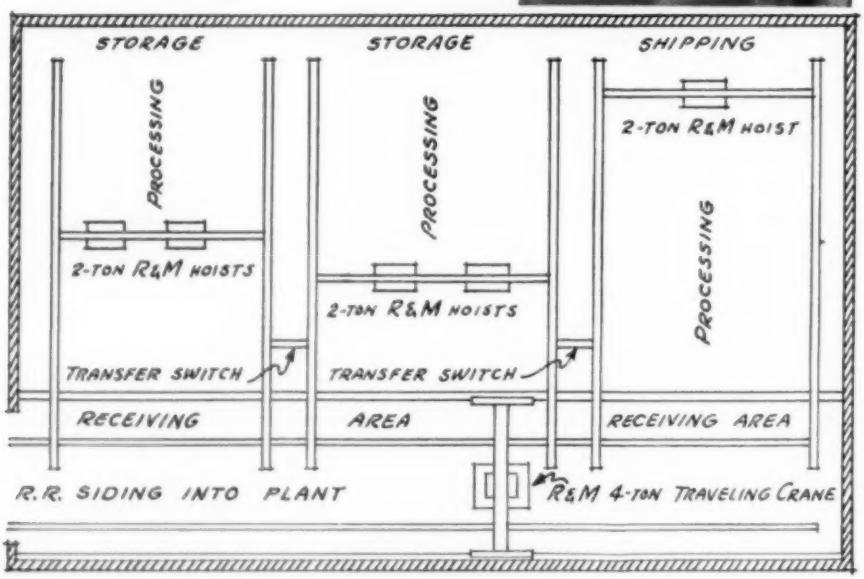
A twenty-minute 16 mm. sound film gladly loaned upon request.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE CLEVELAND 7, OHIO

HOW R & M HOISTS PAY OFF!





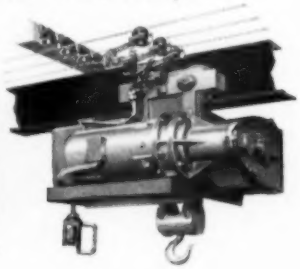
OVERHEAD SYSTEM BRINGS DOWN OVERHEAD COSTS

Tie your materials, machines and men into a neat *profit* package—with R & M electric hoists. Here's what they're doing for Great Lakes steel processing plant. At receiving dock, no demurrage charges. In storage, less rehandling. Fewer interruptions on the processing lines, less down-time on expensive machines. Easier work, too, throughout the plant. Result: lower production costs, *more profits.*

R & M'S DO ALL THE LIFTING HERE . . . One man, with 4-ton traveling crane, unloads steel from gondolas into receiving area. From there, five 2-ton trolley hoists on traveling bridges serve storage, processing lines and shipping. Hoists can be switched from one bridge to another as requirements vary; operators need no special skill or training. Savings in handling costs have been substantial. Congestion reduced to a minimum . . . manpower utilized to best advantage . . . operations set for *peak efficiency.*

KEEP COSTS DOWN—PROFITS UP . . . Plug leaks in *your* profits, streamline *your* materials movement. An R & M specialist will gladly analyze, make recommendations. So "Take it UP with R & M." Hoists and cranes in types and sizes for every purpose. Write *today.*

Type F1—Capacity: 1000-4000 lbs.
Others from 250-20,000 lbs.



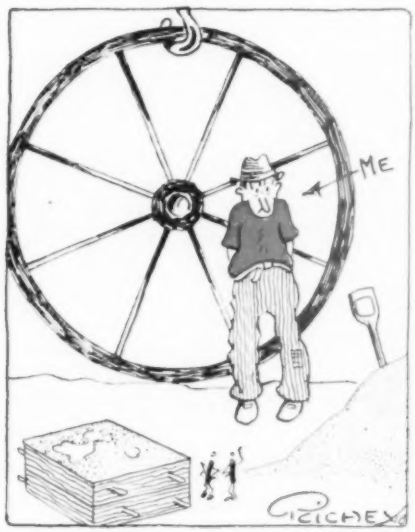
ROBBINS & MYERS · INC.
· HOIST & CRANE DIVISION ·
SPRINGFIELD 91, OHIO · BRANTFORD, ONTARIO
MOTORS · FANS · MOYNO PUMPS · FOUNDED 1878

(*Continued from page* 200)

"I intended to say a few words about the peculiar modesty which induces many foundrymen to produce and send out castings in what you might call an anonymous manner, but I shall have to wait for a more appropriate occasion. Somethin' like the old SeeBee motto: 'The hard jobs we do first. The impossible ones take a little more time!' This job is not exactly impossible, but it may take a little time, which you apparently have plenty of!

I had an inquiry recently from a worthy citizen who had some peculiar experience with a small cupola. He wrote that he would be interested in any comment I might offer. Here, I'll read it for you:

In common with most foundries we have had our own troubles with foundry coke, or perhaps the lack of



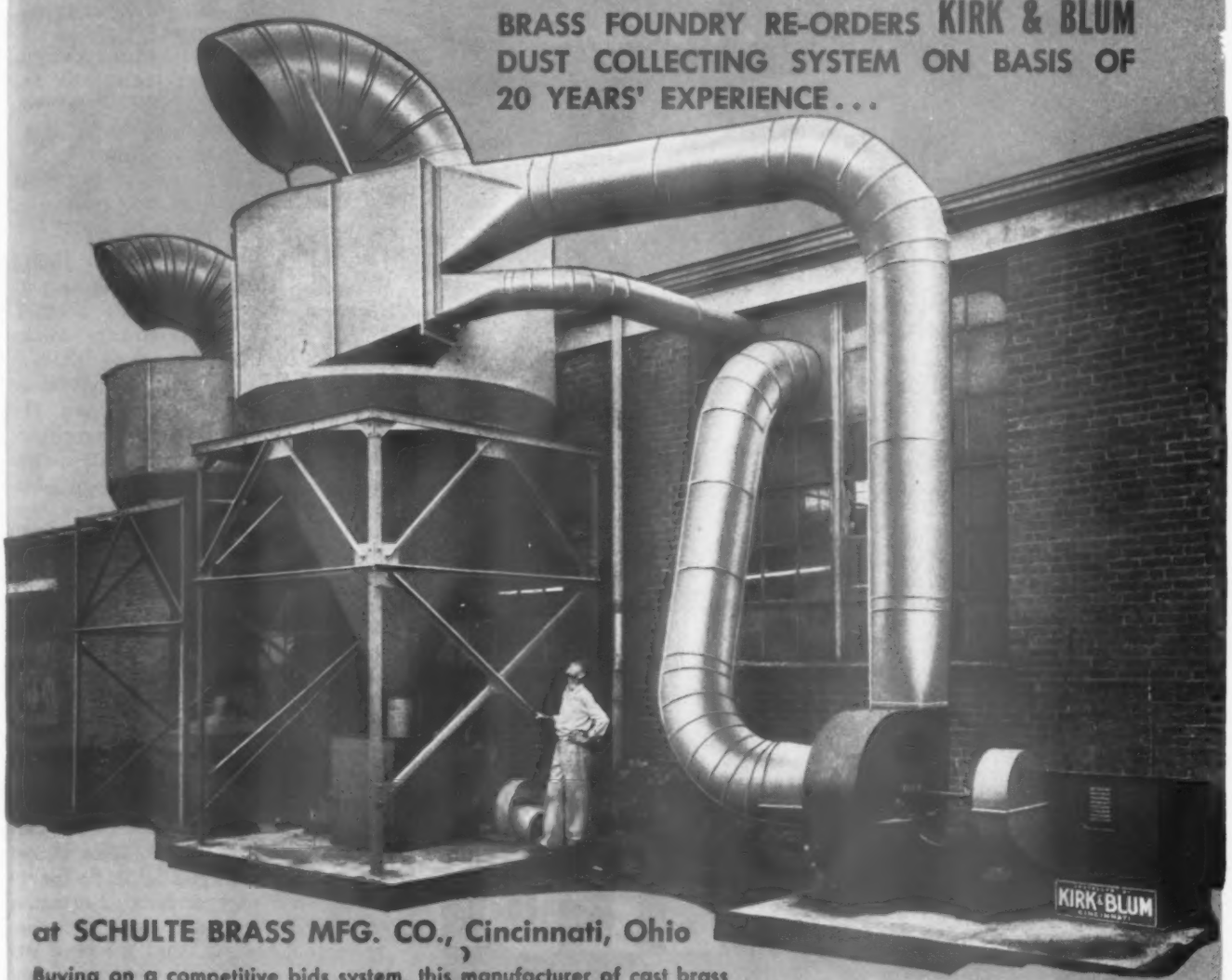
Maybe he found a shrink hole

it. Among other things we tried blast furnace coke. This coke gave moderately good results, until the size shrunk to 1 or 2-in. instead of the usual 2 to 5-in. size. Air for the 34-in. cupola was supplied by a centrifugal fan capable of delivering 3000 cfm. The small coke lowered the melting rate and temperature. We installed a positive pressure blower with a rated capacity of 3500 cfm. We pushed 3000 cfm into the cupola, but succeeded only in gradually producing a thoroughly oxidized iron. Finally larger coke was obtained and we presumed we could anticipate a return to normal operation, still using the positive pressure blower. The iron continued to show signs of oxidation, despite the fact that we maintained normal height beds. Coke was increased from a present day normal of 6:1 ratio, to 5:1 and at times 4.5:1, until melting began to slow down appreciably and metal temperature to decline. We tried cutting down the coke splits to make certain we were not operating with

(*Continued on page* 204)

Greater power savings justify higher initial cost..

BRASS FOUNDRY RE-ORDERS KIRK & BLUM DUST COLLECTING SYSTEM ON BASIS OF 20 YEARS' EXPERIENCE...



at SCHULTE BRASS MFG. CO., Cincinnati, Ohio

Buying on a competitive bids system, this manufacturer of cast brass bathroom accessories and fixtures checked every feature of proposed dust collecting systems. After rechecking and consideration of the notable 20-year service record of an existing Kirk & Blum Polishing and Buffing Dust Collecting System, *Kirk & Blum was selected again.*

The new system, cyclones for which are shown above, proved again that efficient design by Kirk & Blum Engineers gave power savings that more than offset higher initial cost, even over a short period of time.

Whether you have more than twenty Kirk & Blum Systems (as a number of our customers do) or have never owned one, Kirk & Blum Engineers are ready to give expert advice concerning the efficient handling of air. Write for Bulletin V, "Fan Systems for Various Industries" or Bulletin M, "Dust Collecting Systems for Metal Industries."

FOR CLEAN AIR... THE **TOOL**

KIRK AND BLUM

DUST CONTROL SYSTEMS

THE KIRK & BLUM MFG. CO.
2808 Spring Grove Ave.
Cincinnati 25, Ohio

Melting
NON-FERROUS METALS
the efficient way
. . . safely

with . . .
HAUSFELD
FURNACES
Built for Service
FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS
The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(Continued from page 202)

too high a bed. The move was not beneficial.

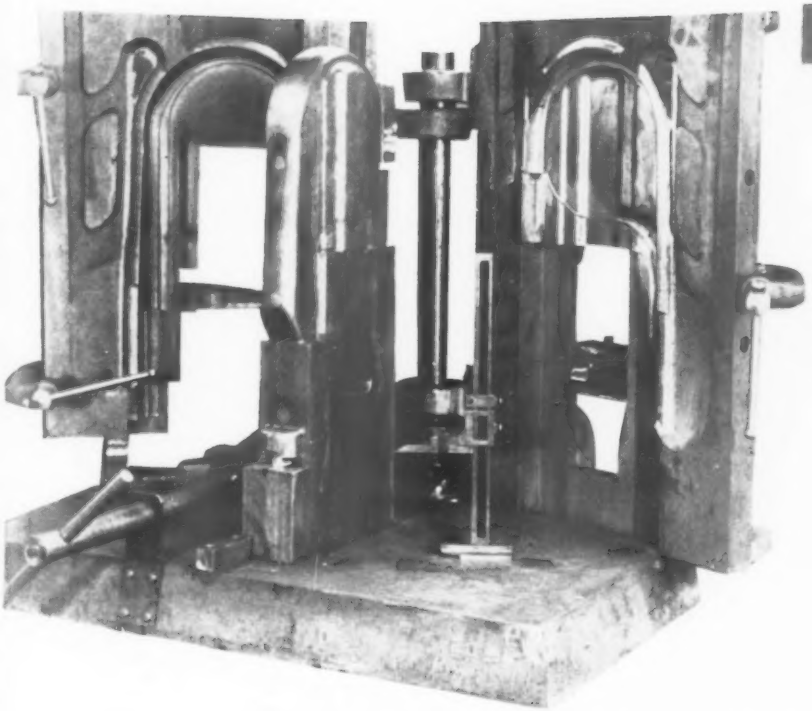
While the positive pressure blower was in use, the worst result of all was the serious burn-in immediately above the tuyeres. We burned 3 to 4 in. deeper than normally and melted out the supporting plates every day. Burning was greatest at the tuyeres which were closest to the blast pipe entry to the windbox. When we replaced the positive pressure blower with the former centrifugal fan, we got out of trouble immediately, a bit of a phenomenon that has us guessing. We shall appreciate your comment.

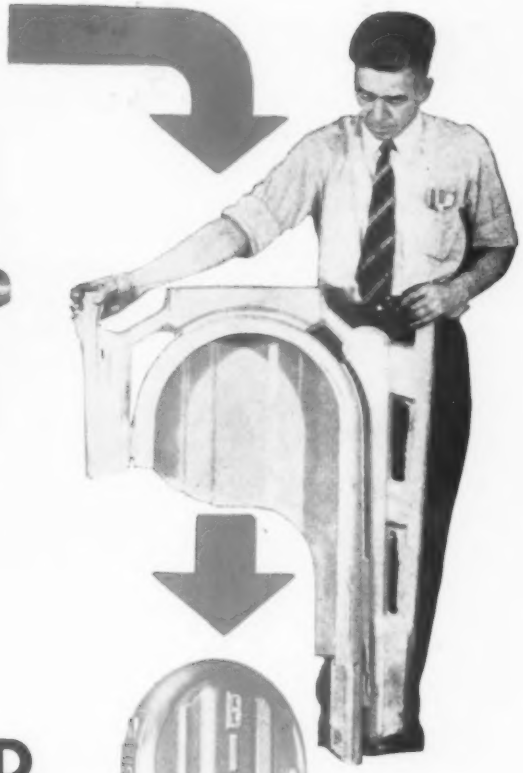
"I suppose you looked in your little black book and there was the answer on page 111. An old lad you worked for away back in the dark ages had an exactly similar experience. He never stopped worrying over the thing until he finally hit on a solution to the problem."

"Well," said Bill, "I'll tell you. I have seen some peculiar cupola performances at one time or another. I have read of some strange doings in cupolas here and there. And I have heard some oral descriptions of performances that would tax the credulity of at least two strong men, but this account of a miraculous cure by hooking on a fan instead of a positive pressure blower was a new one to me. I was strongly tempted to write my inquiring friend that in this particular instance, at least, he was leaning on a broken reed. I could not jump into the breach and triumphantly present him with a banner inscribed with gilt edged letters carrying the desired message. For a fleeting moment, I regret to confess, I toyed with the rather well known technique of certain people who would rather die than admit their ignorance on any subject. The inquiry is thrown in the waste basket and promptly forgotten. If the party of the first part persists in bringing the subject up on a later occasion, he is told blandly, that his first letter must have been lost in transit. With the present party bungling everything in Washington, what can one expect? While deploring my inability to furnish a sharp, clear-cut answer, the following theory was suggested:

The cupola has been in use in this country for nearly 150 years and one would think that in that time foundrymen would be perfectly familiar with every phase of operation, and would be unanimous in their opinions. On the contrary, widely divergent views are held. Several books have been written on the subject. If all the papers published in the AFA

(Continued on page 206)





AN ACCURATE MOLD

producing high quality

ALUMINUM CASTINGS

for a discerning

NATIONAL MANUFACTURER

who asked for, and received

1 · CLEAN CASTINGS

2 · CLOSE ACCURACY

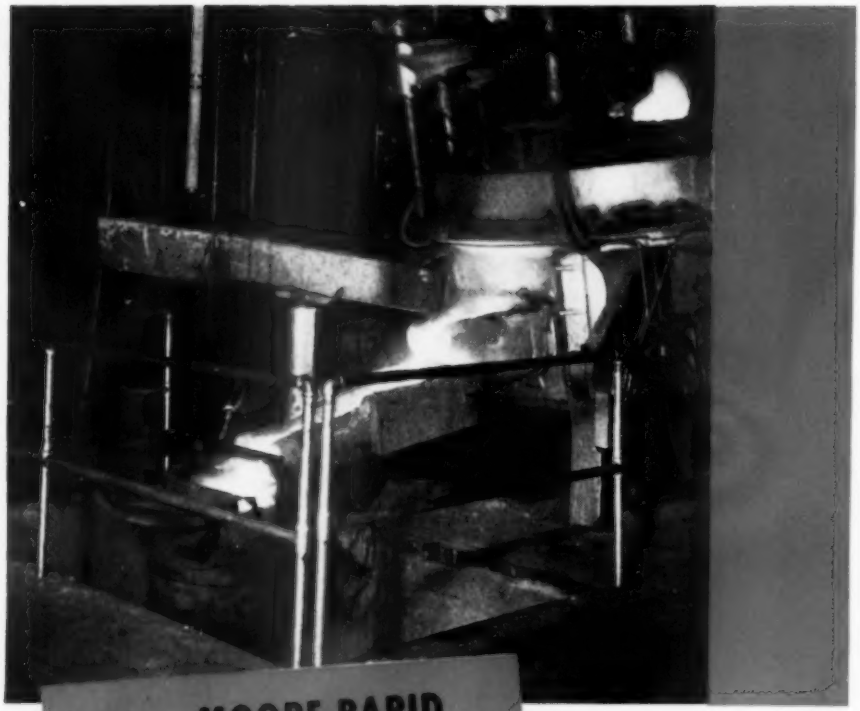
3 · LOWER COST

The BIRO Mfg. Co., makers of meat, fish and bone cutters, required carefully made, economically priced aluminum castings for their new meat cutter pictured here. The MASTER PATTERN CO. designed a permanent mold that produces one saw head casting every seven minutes. These castings are cleaner, have closer dimensional accuracy and are produced with exceptional economy. What is YOUR problem? Send us blueprints or sample castings for quotation.

MASTER PATTERN COMPANY

1315 MAIN AVENUE — CLEVELAND 13, OHIO

DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS



MOORE RAPID
Lectromelt
FOREHEARTH FURNACES

reduce production headaches

The lack of uniformity and poor quality of much of present day raw materials is making the production of high-grade, uniform gray iron extremely difficult. The new Lectromelt Forehearth furnace is the complete answer to this situation.

Lectromelt's Forehearth is an especially designed direct arc type furnace for operation in conjunction with cupolas or air furnaces. It provides high quality metal by:

1. Closely controlling temperature by providing an efficient, readily controllable source of heat.
2. Controlling analysis by additions or refining operations or both.
3. Providing a reservoir or holding capacity for the dual purpose of leveling off the peaks of the demands from the pouring floor and assuring a more uniform analysis by proper mixing.

A Lectromelt Forehearth furnace can help you out of a tough situation. Write today for descriptive literature.
Lectromelt furnaces are made in capacities ranging from 100 tons to 25 pounds.

Manufactured in

CANADA	Lectromelt Furnaces of Canada, Ltd., Toronto 2
ENGLAND, SWEDEN, AUSTRALIA	Birlec, Ltd., Birmingham, England
FRANCE	Stein et Roubaix, Paris
BELGIUM	S. A. Belge Stein et Roubaix, Bressoux-Liege
SPAIN	General Electric Espanola, Bilbao
ITALY	Forni Stein, Genoa

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PENNSYLVANIA

(*Continued from page* 204)

(Now AFS) *Transactions,* in THE FOUNDRY and other publications were placed end to end or side by side, they would cover an area usually referred to as hellangone. This, of course, is on the assumption that the spreader was conscientious and honest and did not shove a bundle down every rat hole, man hole and gutter sewer opening as he ambled along.

However, on one point foundrymen are in pretty fair agreement. And that is that a definite relationship must exist between volume of air in the blast, volume or weight of coke and iron in the charges, and time required for complete combustion. These three elements must harmonize.

With minor variations foundry experts are in agreement on the following as set forth on page 114, *Handbook of Cupola Operation,* issued by the American Foundrymen's Society:

The burning away of the lining above the tuyeres normally is proportional to the temperature of the melting zone and the duration of the heat. Extreme cutting in one spot, which usually occurs over a small bridge or between tuyeres, results from excessive oxidation at that point. Nature of the mixture charged into the cupola has considerable bearing on the life of the lining. A high percentage of steel scrap, involving a higher melting temperature, decreases the life of the melting zone lining. Fluxing material also is important in effect. Lime and fluorspar, if used, should be kept at least 6 in. away from the lining. Fused soda ash, although it has a glazing action on the lining, is so effective in forming a fluid slag and in removal of corrosive oxides, that its use cannot be considered detrimental to the lining.

One of the greatest causes of troubles with the lining of the melting zone is excessive blast. Air under high pressure will drive particles of coke and charge against the lining. Abrasion will result. Some of the iron will be oxidized and its solution in the slag will render the latter very corrosive. For these reasons, far better results are obtained by the use of a volume meter rather than by attempting to control the supply of air by the pressure gage alone. Lining of the cupola can be kept intact much longer than usual by not coking the last charge and by shutting off the blast as soon as a white heat is attained. More burning out is caused at the end of a heat than at any other time because the blast comes into direct contact with the lining. After the stock turns white, the bed will melt the remaining small amount of iron. Therefore the blast should be shut off.

Basing a verdict on the foregoing and on particulars submitted in your case, I am inclined to the opinion

(*Concluded on page* 208)

20 YEARS
IN A BRONZE FOUNDRY

MOST of the overhead Cleveland Tramrail rail system, including several transfer bridges, serving the bronze foundry of the Oberdorfer Foundries, Inc., Syracuse, N. Y., has been in continuous operation for 20 years.

The equipment serves two electric furnaces, three oil furnaces and six crucible furnaces; handles hot crucibles and delivers all metal to the molds. Despite the usual grit and dirt, present in all foundries, the maintenance required for the tramrail equipment is nearly negligible.

Recently Oberdorfer installed a new Cleveland Tramrail archbeam runway and transfer bridge on which carriers from the old system had to operate. Because Cleveland Tramrail rail sizes are never changed there was no problem in supplementing the old system with this new equipment.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3818 EAST 286th ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

North • East • South • West . . . It's Schramm

. . . doing jobs like these in Your Field

At almost every turn you need compressed air!

The check list (at right) indicates some of the many compressed air jobs to be done, all of which are accomplished easily, quickly and economically with Schramm Air Compressors.

Here's *why* you profit, as others have, by using Schramm: they're compact, lightweight, easy to start; built for rugged jobs, to provide a continuous flow of air.

Important features include 100% water cooled; mechanical intake valve; forced feed lubrication and easy, electric push-button starting.

Performance everywhere has proved Schramm Air Compressors can do any compressed air job you require. Write today for list of models and sizes.

- Air Hoists, Lifts and Motors
- Core Breaking
- Drilling Salamanders
- Cleaning Castings
- Operating Molding Machines
- Applying Core Paste
- Paving Breakers for Removing Slag from Blast and Reverberating Furnaces
- Pneumatic Hammers and Drills
- Tapping Blast Furnaces
- Wire Brush Cleaning Castings
- Grinding Billets and Castings
- Pneumatic Sand Sifter
- Aerating Metal in Bessemer Process
- Blowing Out Cores
- Chipping Castings and Billets

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

(*Concluded from page* 206)

that you are blowing too much air into the cupola. Maximum melting capacity of a 34-in. cupola is about 5 tons per hour. This means a blast consumption of approximately 150,000 cu ft per hour or 2500 cfm. With the positive pressure blower all the air up to 3000 cfm was delivered. It was too much for the taking-up capacity of the coke. Result, oxidized iron.

Although capable of delivering 3000 cfm, the centrifugal fan did not deliver that amount. Resistance of small tightly packed coke inside the tuyeres cut the delivery down to about 2500 cfm, in this instance the proper amount.

If a suggestion is in order—and a frank and good-natured suggestion should be in order at any time—it is that you secure a copy of *Melting Iron in The Cupola,* by J. E. Hurst and published by the Penton Publishing Co., Cleveland, also a copy of *The Cupola Handbook* published by the American Foundrymen's Society, Chicago.

FRICTION CUTTING GATES AND RISERS

(*Continued from page* 97)

sawing machine is excellent for this purpose because most cutting operations on aluminum and magnesium castings may be economically executed at velocities of from 3000 to 4000 fpm, with no limitations on thickness of cut.

Primarily essential to get the most from the high-speed machine with the cutting of the light metals is a special coarse pitch saw band (Fig. 6). This new type of tooth design affords a tool having maximum free and cool cutting qualities, since it provides narrow saws of coarse pitch construction without sacrificing band strength. From the viewpoint of increased production, high-speed sawing has relatively the same effects on the light metals as friction sawing has on ferrous metals.

Regardless of the cool cutting action of the skip-tooth or buttress saw, the importance of some form of lubrication when cutting the light metal sheets, billets or castings is highly significant to prolong tool life. Very efficient is some dependable form of drip lubrication with 40-50 drops per minute, but preference should be given to the spray system, which is more efficient and more economical in the long run. A high-grade sulphurized soluble oil added to 10 parts

(*Concluded on page* 210)

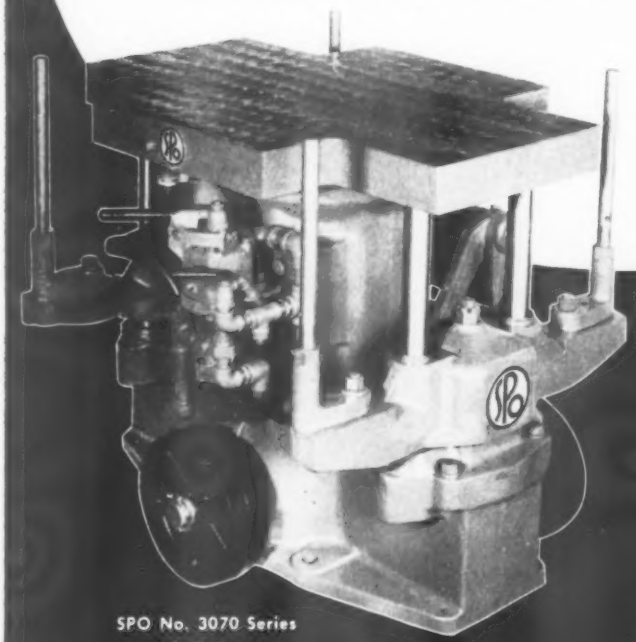
FOR ENDURANCE AND LONG LIFE BUY SPO MOLDING MACHINES

Find out for yourself what SPO's Exclusive Inverted Jolt will do for your Cost Figures!

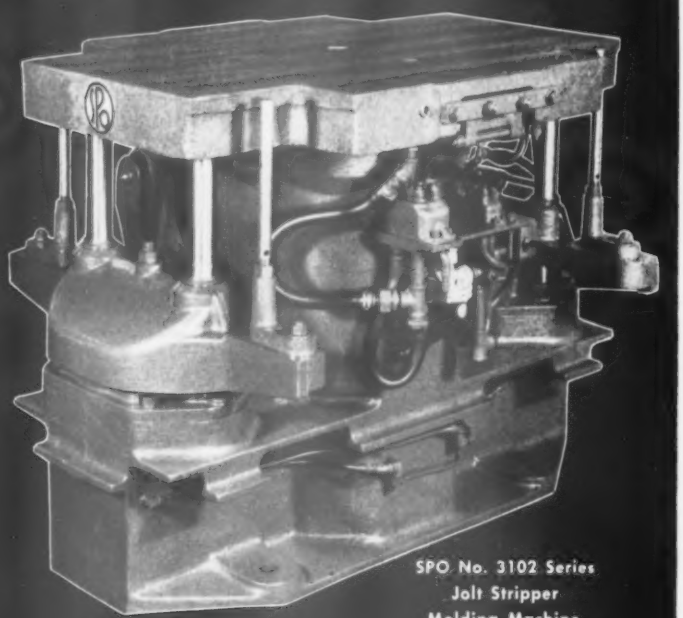
Molds? Yes!—you want more of them, of course, but they must all be accurate, usable molds, or "no count". Everywhere, SPO's inverted jolt feature is consistently stepping up both the quantity and the quality of finished castings. It definitely improves speed, increases ease of operation and lengthens life — without upkeep. Get all the facts.

Always find out FIRST what SPO has to offer

MEMBER



SPO No. 3070 Series Jolt Stripper Molding Machine.



SPO No. 3102 Series Jolt Stripper Molding Machine.

You can't beat SPO's for speed

SPO INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE · · CLEVELAND 5, OHIO

Pick up, Move, Put down, Repeat

When an electric overhead traveling crane will pick up, move, put down heavy loads over and over again — and do it all economically, smoothly, safely — year after year, that's sweet music in the ears of plant engineers and cost accountants.

Ordering an overhead traveling crane that will handle your lifting and moving work involves more than just specifying top capacity. With a Shepard Niles overhead traveling crane you get the capacity you need, sound design, rugged and precise construction and reserve strength — as well as assurance of trouble-free operation. But you get much more. You get an overhead traveling crane designed and built to handle your own particular job.

Trained, experienced Shepard Niles engineers have data on thousands of crane installations, in every type of industry. All this information and experience is available to you without obligation. Let a Shepard Niles engineer help you select the crane best suited to you, out of the many sizes and types available.

★ We are unbiased in our recommendations. If a survey of your material handling shows you need an electric hoist instead of an overhead traveling crane, Shepard Niles will recommend a hoist. America's pioneer builder makes both electric overhead traveling cranes and electric hoists for every need.

Shepard Niles
CRANE & HOIST CORPORATION

360 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

(*Concluded from page 208*)

water makes an excellent spray mixture. This form of lubrication shows a general increase in saw life on the light metals of at least 25 per cent and very often as much as 50 per cent.

No facts and figures in connection with high-speed sawing light metals could be more authentic than those derived from laboratory procedure in connection with customer tests, as shown in Table II, which represent possible production results under average field conditions. All accompanying tests have one basic purpose, namely, to determine the proper saw width, pitch, velocity and work pressure to obtain maximum cutting

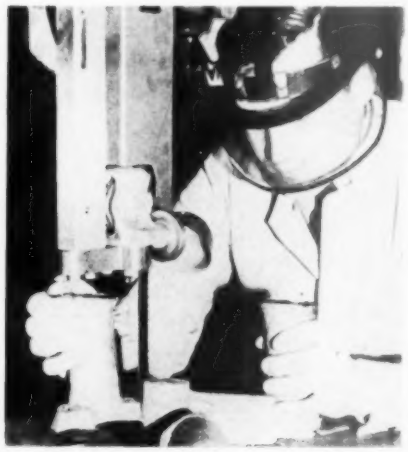


Fig. 6—Band sawing 1½-in. gate of aluminum casting with special blade having widely spaced teeth operating at 3600 fpm

rates consistent with maximum tool life and highest quality of cut. However, some compromise is often desirable and of course this necessarily means sacrificing some angle of total efficiency for another. All tests in Table II relate to material thickness exceeding ½-in. and for this reason cutting rates are given in square inches per minute. With materials less than ½-in., it is customary to designate such rates in lineal inches per minute.

The contribution of the metal trades to the growth of Berks county, Pa., is told in one chapter of a book recently published to commemorate the 200th anniversary of Reading, Pa. The book, "Industrial Berks County," was written by Arthur D. Graeff, Overbrook, Pa., High School and illustrated by Florence Starr Taylor, Lancaster, Pa. It was published by Textile Machine Works, Berkshire Knitting Mills and Narrow Fabric Co., all of Reading, and presented to the people of Reading and Berks county.

Jolt-squeezer molding stations showing that any size Foundry job is a job for Jeffrey.

What JEFFREY Makes:

MOLD CONVEYORS
FLASK FILLERS
AERATORS
SANDITIONERS
PADDLE MIXERS
SCREENS
BIN VALVES
CONVEYORS
BUCKET ELEVATORS

Jeffrey-Equipped means Efficient Operation

A close-up view of a sand preparation plant.

Jeffrey belt conveyor distributing sand to molders' hoppers.

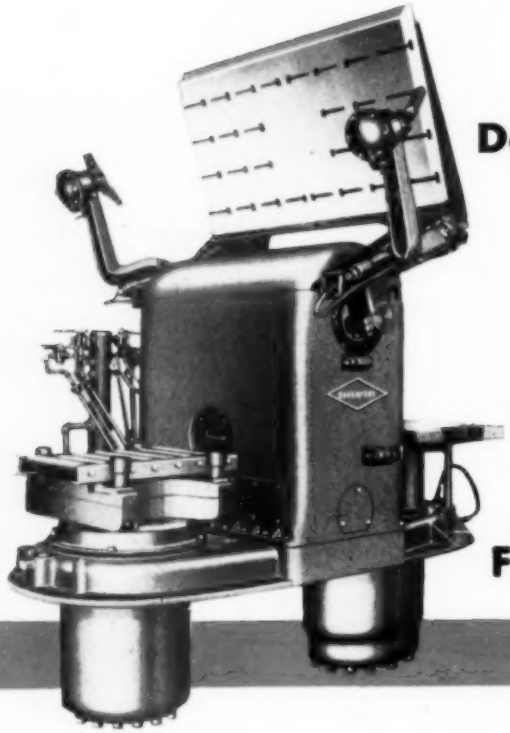
THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

907-99 North Fourth St., Columbus 16, Ohio

Baltimore 1, Birmingham 3, Boston 16, Buffalo 2, Chicago 1, Cincinnati 2, Cleveland 13, Denver 2, Detroit 13, Harlan, Houston 5, Huntington 19, Jacksonville, Milwaukee, New York 7, Philadelphia 3, Pittsburgh 22, St. Louis 3, Salt Lake City 1, Scranton 3

Complete Line of Material Handling, Processing and Mining Equipment



"Davenport" Jolt Rollover Draw Model "A"

Davenport Molding Machines Put

The Big Punch

In Your FOUNDRY PRODUCTION

With bare knuckles or padded gloves, you must put the punch in today's costs.

Give your men the best in molding equipment. "Davenport" Molding Machines will deliver better molds—in less time—at lower cost.

Let us send you our catalog.

DAVENPORT MACHINE AND *Foundry Company*

DAVENPORT IOWA U. S. A.

Representatives:
Canada—Canadian Foundry Supplies & Equipment Ltd., Toronto and Montreal
France, Belgium, Luxemburg, Switzerland—Ph. Bonvillain & E. Ronceray, Choisy-Le-Roi, Rue Paul Carle, Seine, France
All other foreign countries—R. K. Price Associates, Inc., 70 Pine Street, New York 5, New York, U. S. A.

OBITUARY

RALPH W. JONES, 66, superintendent of foundries, Union Switch & Signal Co., Swissvale, Pa., died Aug. 15, in Pittsburgh. Mr. Jones had been associated with the Swissvale company for 21 years, and also served on the board of directors, Stubnitz-Green Spring Corp., Adrian, Mich. He was a past president and a life member of the Pittsburgh Foundrymen's Association.

* * *

Harry H. Barber, 70, chairman of the board of directors, Barber-Greene Co., Aurora, Ill., died Sept. 6. Mr. Barber, one of the pioneer designers of modern construction equipment, retired as president of the company in 1945. A graduate of University of Illinois in 1907, he was associated with Stephens-Adamson Mfg. Co., Aurora, from that time until 1916, when he formed a partnership with William B. Greene.

* * *

Neil C. Hurley, 78, chairman of the board of directors, Independent Pneumatic Tool Co., Aurora, Ill., died Aug. 2. A native of Galesburg, Ill., Mr. Hurley went to Chicago in 1906, and with his brother, the late Edward N. Hurley, established the Hurley Machine Co. He became president of Independent Pneumatic Tool Co. in 1933, and board chairman in 1944.

* * *

Ira R. Calkins, 75, former president of the Electric Wheel Co., Quincy, Ill., died there Aug. 21. Mr. Calkins was associated with the company for over 40 years, and prior to assuming the presidency in 1935 had served as vice president and secretary. He retired in 1939 and became chairman of the board of directors.

* * *

Robert L. Cleland, 71, retired eastern sales manager, Eastern Clay Products Inc., Jackson, O., died in Buffalo, Aug. 7. Mr. Cleland was first associated with Whitehead Bros. Co., New York and later became connected with Eastern Clay Products Inc. He had a major part in the pioneering and development of synthetic sand practice.

* * *

Carl A. Carlson, 60, sales engineer, Norton Co., Worcester, Mass., died Aug. 29, in a plane crash near Winona, Minn. Mr. Carlson was born in Stockholm, Sweden, and was graduated from the Sala Engineering School there. He came to United States in 1912, and joined Norton Co.'s machine shop a year later. In 1920 he was sent to France to organize a branch plant near Paris, re-

(*Concluded on page* 216)

Foundry work moves faster with

2 SPEED **METEOR**

ELECTRIC HOISTS

Capacities from ½ to 3 tons

To meet demands for greater production and higher efficiency, many progressive foundries are replacing obsolete, undependable handling equipment with new heavy duty, two-speed Meteors. Designed specifically for foundry work, the Meteor provides slow speed for careful starting of loads... and high speed for fast lifting when the load is free. The Meteor is fully enclosed, weather-proofed and protected against dust and dirt. Airplane-type cooling fins quickly dissipate heat generated by gears and load brake. Low headroom, precision construction, motor thermal protection, only 110 volts in push button station, helical gears, are other quality features. If you want extra value for your investment, write today for literature and prices.

WRITE *for Bulletin 142... contains 22 pages of specifications, illustrations and prices.*

CHISHOLM-MOORE

HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

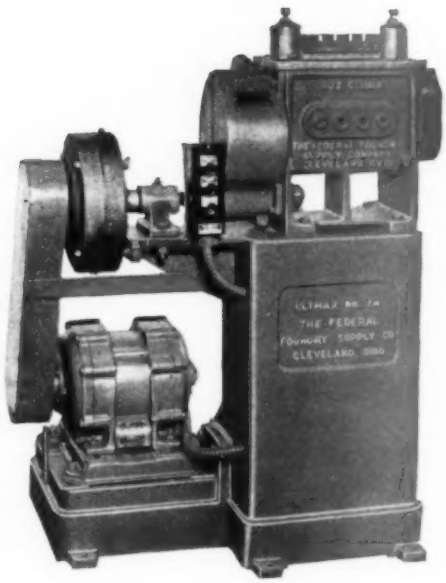
See us at Booths 826-827 Materials Handling Exposition, Philadelphia—January 10-14.

FEDERAL SUPPLIES

FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.

CLIMAX WIRE STRAIGHTENERS



Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely — by unskilled labor. A complete descriptive circular is yours for the asking.

The "Lightning" Clamp

The "Holdtite" Clamp

CLAMPS

Federal offers two types of flask clamps.

The "Lightning" clamp is an eccentric type, requiring no wedges and available in two sizes: No. 2, 8" to 12" and No. 3, 12" to 20".

The "Holdtite" is an adjustable clamp designed for use with wedges and is also offered in two sizes: No. 1, 13" to 23" and No. 0, 18" to 33".

Both clamps made of sturdy malleable iron, rigidly reinforced to prevent distortion.

FEDERAL'S WONDER CUTTERS

Two compact cutters for rods and band iron. One cuts up to ⅝" round and the other to ⅞" round. Readily mounted on any bench. Users say they're worth their weight in gold!

RUBBER-COVERED SHOVEL HANDLES

The best insurance you can buy against damaged patterns, core boxes or flasks. The pean-shaped grip is ideal for ramming.

They will fit your present shovels or you can order your next shovels with them already installed.

TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.

BLAST CLEANING NOZZLES

Air consumption is reduced and the blast is concentrated because the hole in the nozzle wears very slowly. Made in all sizes and types. Write for circular.

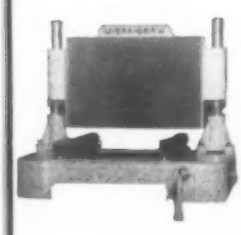
FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

SHUR-SPOT SPRUE

Designed for use on squeezer-made molds, Shur-Spot squeezes right down with the sand. When the squeezer board is removed, the Shur-Spot pops up and can be lifted right out. The result is a fully completed and properly located pouring sprue that requires no finishing. Shur-Spot Sprue eliminates danger of falling sand.

For complete information on the Shur-Spot Sprue, write for the circular on this low-priced easy-to-use item.



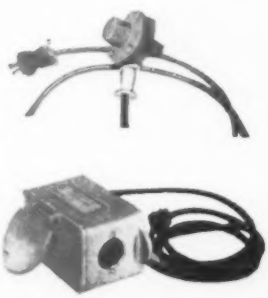
FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown here. Immediate delivery — write for details.

FEDERAL VIBRATOR No. 2 and 5

Federal's own make and available for immediate delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. $15.60 each, f.o.b. Cleveland; No. 5 for heavier duty—$20.40 each.

Federal also has a new "convenience outlet knee switch." No taping, soldering or wiring. Plug in—that's all. Carried in stock. $6.50 each, f.o.b. Cleveland, Ohio.



THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

CROWN HILL, W. VA. • CHICAGO • MILWAUKEE • DETROIT • ST. LOUIS

CHATTANOOGA, TENN. • ST. PAUL • NEW YORK • RICHMOND, VA. • UPTON, WYO.

Chamberlain Co., Los Angeles, Calif. · Pacific Graphite Works, Oakland, Calif. · LaGrand Industrial Supply Co., Portland, Ore.

Overseas Commodities, Ltd., Vancouver, B. C. · Newman Foundry Supply, Ltd., Montreal, Que.

Spencer Foundry Turbo

SPENCER FOUNDRY PROTECTION

for Men, Melts and the Pours

Spencer Turbos are the accepted standard for foundry cupolas because they provide maximum reliability of the air supply over long continuous service. Constant volume or weight of air can be maintained by hand or automatic control whichever is preferred.

High dust counts and shut-downs must be kept to a minimum in the modern foundry.

Spencer Vacuum Cleaners, stationary or portable, remove overhead dirt, clean patterns, molds and castings, and reclaim foundry sand. It helps keep the dust count down.

Both machines are of the centrifugal type with wide clearances, light weight impellers, low peripheral speeds, and only two bearings.

The result, a quiet running machine which requires no special foundations. For reliability, we can refer you to Spencers that have been in service 25 to 40 years.

ASK FOR THESE SPENCER BULLETINS

No. 131	General Information
No. 116	Piping and Valves
No. 137	Boiler Cleaning
No. 102	Portable Vacuum Cleaners
No. 125	Central Vacuum Cleaners
No. 130	Sump Tank Cleaner
No. 143	Pneumatic Conveying
No. 142	Turbo-Agitation
No. 127	Turbo-Compressors
No. 109	Gas Boosters
No. 112	Foundry Blowers

Cleaning molds with Spencer Vacuum

332-D

SPENCER HARTFORD

THE SPENCER TURBINE CO.
HARTFORD 6, CONN.

(*Concluded from page* 213)

turning to Worcester in 1922. He has been associated with the sales engineering department since 1923. Mr. Carlson was outstanding as an inventor of specialized machines for high speed grinding, a consultant on snagging operations and author of many technical articles. He was a member of the New England Foundrymen's Association and the American Foundrymen's Society.

* * *

Harry Stevenson, 69, president since 1939 of the International Molders and Foundry Workers Union of North America, died Aug. 24, in Manchester, England, after attending the International Conference of Foundry Unions in Stockholm, Sweden, earlier in the month. Born in Birmingham, he left England for the United States in 1898 and worked for the Farrel Foundry, Ansonia, Conn., and the Cyrus Currier Foundry, Newark, N. J., from which he retired in 1921.

* * *

Guy L. Cannon, 65, president of the Berkshire Mfg. Co. and Cannon Vibrator Co., Cleveland, manufacturers of molding machines and air vibrators, died in Cleveland, Sept. 4. Mr. Cannon joined the Berkshire company more than 40 years ago, and served for many years as secretary. He became president two years ago.

* * *

Emil R. Gasser, 44, for the last three years director of research activities with headquarters at the Buffalo plant of Farrel-Birmingham Co. Inc., Ansonia, Conn., died Sept. 5. Mr. Gasser was born and educated in Switzerland and joined Farrel-Birmingham in 1928.

* * *

M. M. Clark, 55, district sales manager at Canton, O., for Climax Molybdenum Co., New York, died Aug. 8. Mr. Clark's previous connections included United Alloy Steel Corp., Central Alloy Steel Corp., and Carnegie-Illinois Steel Corp.

* * *

Louis R. Taylor, 75, president, Loeffelholz Co., Milwaukee, died at his home there Aug. 16. Mr. Taylor, a native of Providence, R. I., went from New York to Milwaukee in 1915.

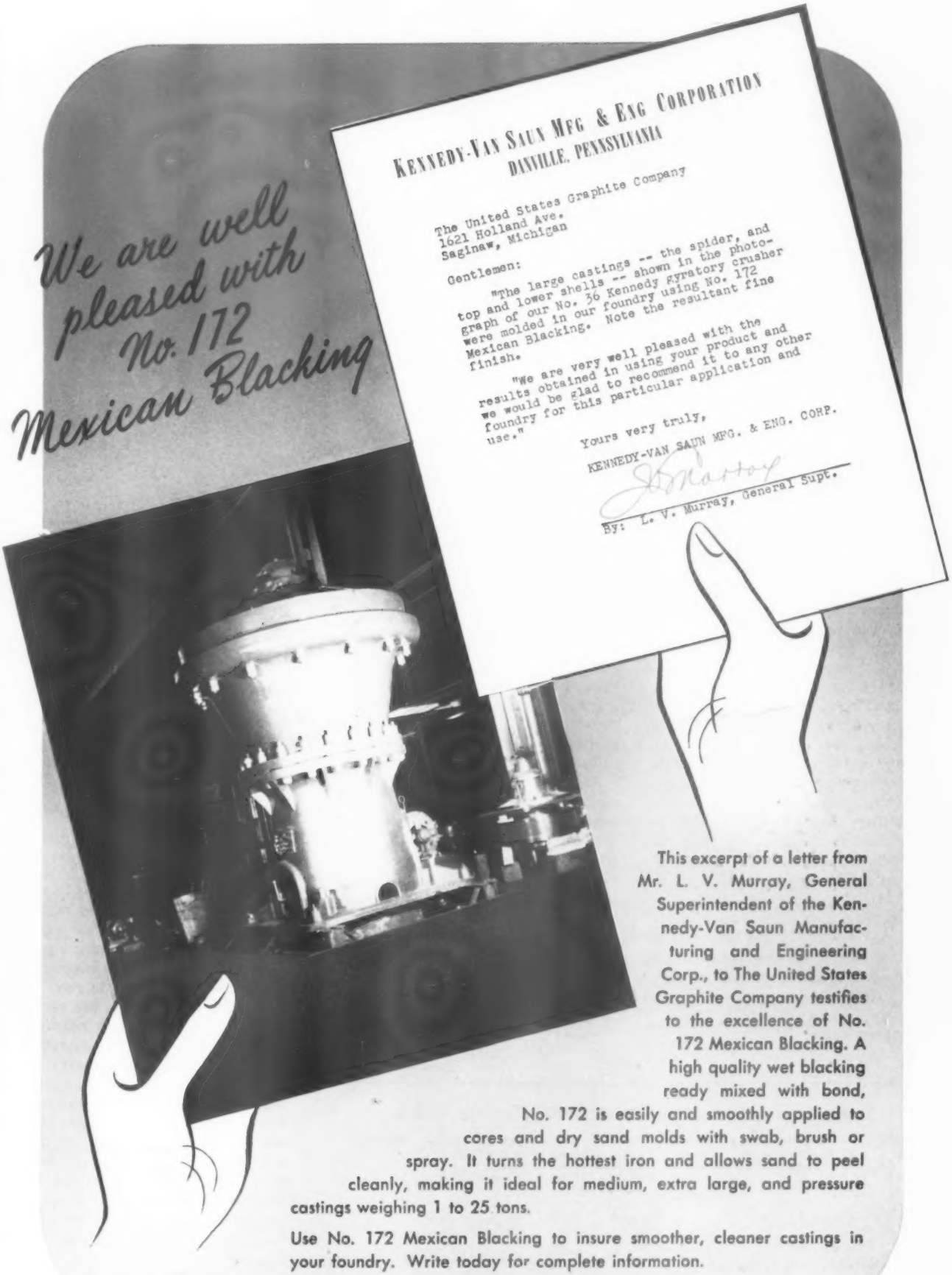
* * *

Thomas D. Hogan, 47, president, Orme Co., Michigan City, Ind., died Aug. 15.

* * *

Colin R. Walcott, 64, secretary-treasurer, Newaygo Engineering Co., Newaygo, Mich., died Sept. 8. He had been with the company 38 years.

We are well pleased with No. 172 Mexican Blacking


KENNEDY-VAN SAUN MFG & ENG CORPORATION
DANVILLE, PENNSYLVANIA
The United States Graphite Company
1621 Holland Ave.
Saginaw, Michigan
Gentlemen:
"The large castings -- the spider, and top and lower shells -- shown in the photograph of our No. 36 Kennedy gyratory crusher were molded in our foundry using No. 172 Mexican Blacking. Note the resultant fine finish.
"We are very well pleased with the results obtained in using your product and we would be glad to recommend it to any other foundry for this particular application and use."
Yours very truly,
KENNEDY-VAN SAUN MFG. & ENG. CORP.
By: L. V. Murray, General Supt.

This excerpt of a letter from Mr. L. V. Murray, General Superintendent of the Kennedy-Van Saun Manufacturing and Engineering Corp., to The United States Graphite Company testifies to the excellence of No. 172 Mexican Blacking. A high quality wet blacking ready mixed with bond, No. 172 is easily and smoothly applied to cores and dry sand molds with swab, brush or spray. It turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons.

Use No. 172 Mexican Blacking to insure smoother, cleaner castings in your foundry. Write today for complete information.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

FLEXIBLE MOLDS

FOR LOW-MELT ALLOYS

By THOMAS A. DICKINSON

MOLDS made from flexible materials have a number of basic advantages to recommend their usage, whenever possible, for casting purposes:

1. They can be fabricated with little equipment by means of simple casting and coating techniques on inexpensive wood, metal, plaster, ceramic, and even wax patterns.

2. They frequently eliminate the need for "piece molds"—even when the pattern has rather abrupt backdrafts and undercuts.

3. They do not have to be replaced each time a new casting is produced.

4. They can be used to produce castings which will subsequently require little or no machining.

Offsetting these advantages to some extent is the fact that few (if any) flexible mold materials can withsand casting temperatures of more than 300° F. However, it is well worth noting that there are a number of commercial alloys which can be melted at lower temperatures and used for a variety of production purposes. Among these low-melt alloys are the typical ones listed in the accompanying table.

Most of these alloys can be cast with considerable precision, due to the fact they have a tendency to expand slightly while solidifying; and, although their physical properties are not generally comparable to the properties of alloys with higher melting temperatures, they will yield castings with as much as 13,000 psi tensile strength or 16,000 psi compressive strength.

Generally speaking, low-melt alloys can be cast in flexible molds made from the following materials: Agar compounds; glue-gelatine compositions; elastomeric thermoplastics; rubber-latex preparations.

Agar compounds are materials whose basic ingredients are derived from seaweed, and should generally be used only in making molds for alloys which melt at temperatures of less than 150° F because their moisture content will otherwise create blowholes and related defects. A typical agar compound is:

Agar	10 parts
Oil soap	10 parts
Magnesium sulphate	4 parts
Cellulose waddings	1 part
Water	70 parts

Although these ingredients will not fuse until they have been mixed and heated to a temperature of about 212° F, the resultant agar compound can be cooled to temperatures of less than 120° F before it is cast. Therefore, while agar molds are somewhat delicate and difficult to handle, agar compounds may be considered desirable whenever it is necessary to cast a flexible mold on an extremely delicate pattern without causing damage. For example, molten agar can be cast on paraffin or human flesh without consequent melting or burning. However, since agar molds rapidly dehydrate and lose their cast impressions, it is generally advisable to use agar materials for the production of temporary forms in which plaster patterns for more durable molds can be cast.

Slightly more durable and useful than agar compounds, yet limited in their applications, are glue-gelatine compositions, of which the following

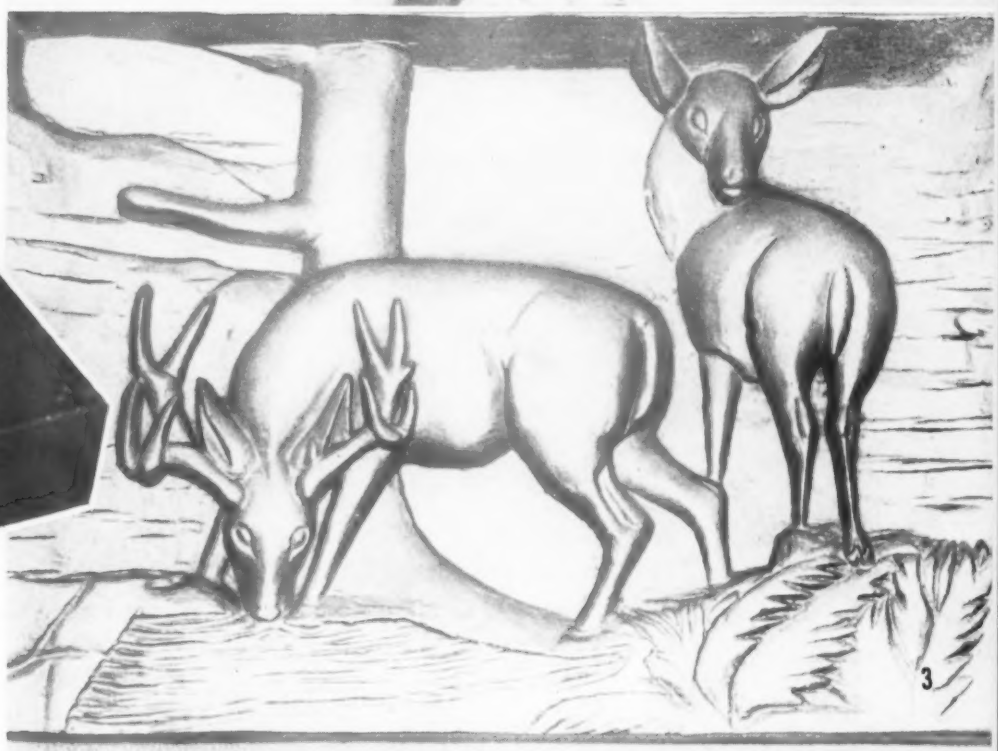
Typical Low-Melt Alloys Used With Flexible Molds

Alloy Name	Molten Range	Bismuth	Lead	Tin	Cadmium	Indium	Others
Cerrolow*	105-147° F.	39%	20.8%	10.4%	7.80%	22%	....
Wood's Alloy	135-155° F.	50%	25%	12.5%	12.5%	....	....
Cerrobend*	149-158° F.	47.5%	25.4%	12.6%	9.5%	....	5% Mercury
Lipowitz's Alloy	152-160° F.	50%	27%	12.5%	10.5%	....	....
Cerrosafe*	160-170° F.	40%	40%	11.5%	8.5%	....	....
Cerrodent*	165-175° F.	50%	34.5%	9.3%	6.2%	....	....
D'Arcet Alloy	180-200° F.	50%	25%	25%	....	....	....
Newton's Alloy	190-201° F.	50%	30%	20%	....	....	....

NOTE: Above alloys can be melted at less than the boiling point of water.

Cerroseal*	220-244° F.	40%	40%	20%	....	....	....
Cerromatrix*	240-250° F.	48%	28.5%	14.5%	....	....	9% Antimony
Cerrobase*	250-260° F.	52%	48%	....	....	....	....
Cerrotru*	260-281° F.	58%	....	42%	....	....	....
Cerroseal*	285-300° F.	60%	....	....	40%	....	....

* Trade names of Cerro de Pasco Copper Corp.



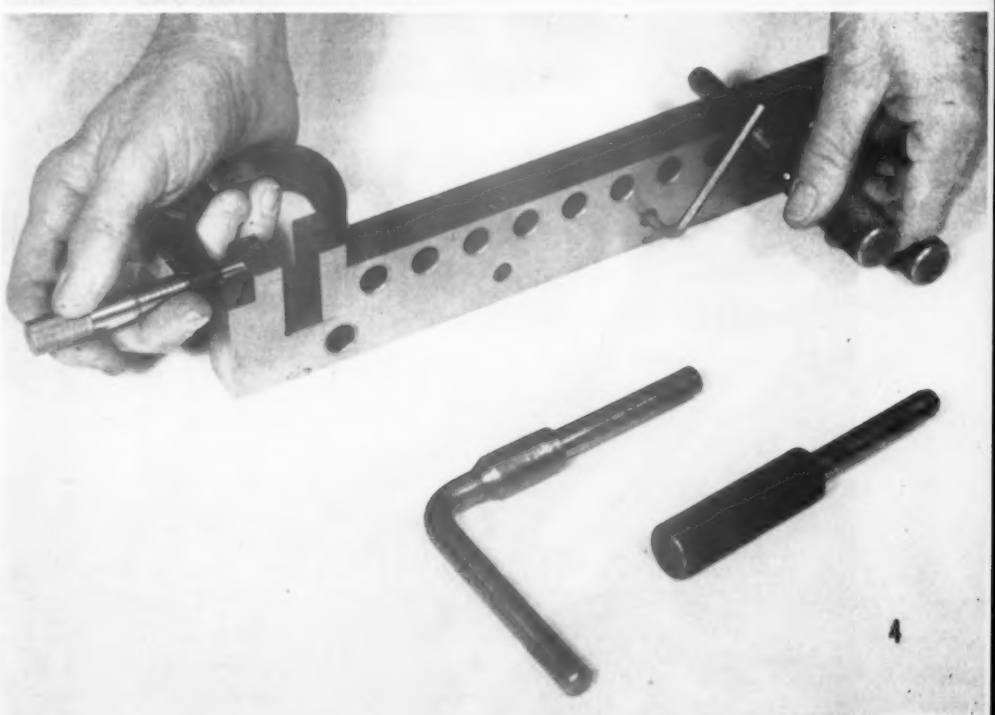


Fig. 1—Flexible mold used to cast the horse shown in Fig. 2. The mold was cast with a horse pattern mounted on a temporary base, so that the latter could be removed separately from the solidified mold. Then the indicated slits were cut between the pattern legs, permitting the pattern to be removed without damage

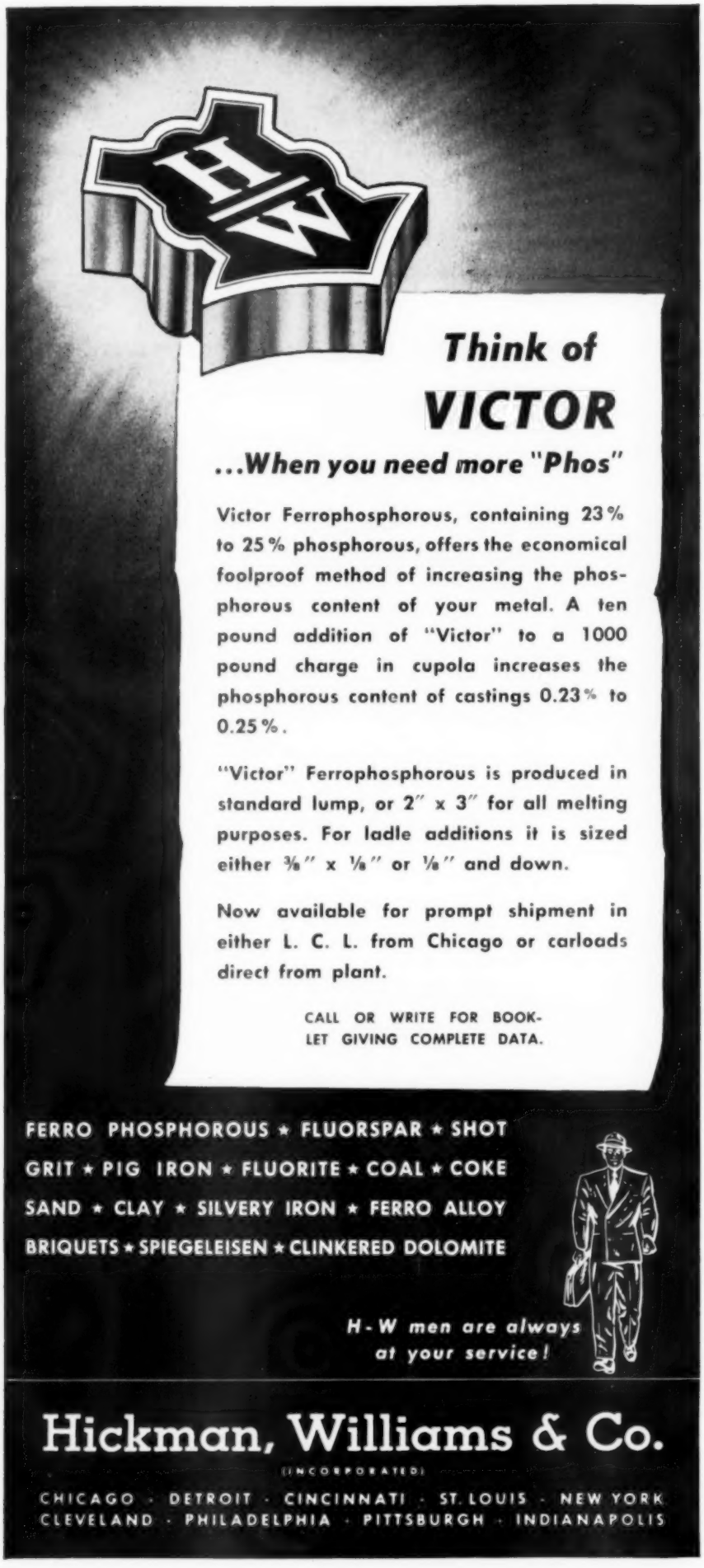
Fig. 3—A low-melt alloy plaque cast in a flexible mold. Pattern for the mold was an original wood carving

Fig. 4—Special-purpose microbar, components of which have been rapidly and accurately reproduced by casting low-melt alloys in flexible molds

is typical:

Gelatine	6 parts
Laundry soap	1 part
Glycerine	1 part

The "glue" (or gelatine) is prepared by soaking in water for about 12 hours, after which excess water is poured off and the gelatine is combined by heat-fusion with the re-


H-W
Think of
VICTOR
...When you need more "Phos"
Victor Ferrophosphorous, containing 23% to 25% phosphorous, offers the economical foolproof method of increasing the phosphorous content of your metal. A ten pound addition of "Victor" to a 1000 pound charge in cupola increases the phosphorous content of castings 0.23% to 0.25%.
"Victor" Ferrophosphorous is produced in standard lump, or 2" x 3" for all melting purposes. For ladle additions it is sized either ⅜" x ⅛" or ⅛" and down.
Now available for prompt shipment in either L. C. L. from Chicago or carloads direct from plant.
CALL OR WRITE FOR BOOKLET GIVING COMPLETE DATA.
FERRO PHOSPHOROUS ★ FLUORSPAR ★ SHOT
GRIT ★ PIG IRON ★ FLUORITE ★ COAL ★ COKE
SAND ★ CLAY ★ SILVERY IRON ★ FERRO ALLOY
BRIQUETS ★ SPIEGELEISEN ★ CLINKERED DOLOMITE
H-W men are always at your service!
Hickman, Williams & Co.
(INCORPORATED)
CHICAGO · DETROIT · CINCINNATI · ST. LOUIS · NEW YORK
CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS

maining components in the mixture.

As a rule, glue-gelatine compounds melt at temperatures of less than 225° F and solidify at temperatures of 120 to 150° F. Accordingly, they can be used to form molds at patterns with only slightly more heat resistance than the patterns used in connection with agar molds; and, since glue-gelatine molds can be dehydrated without damage, it is possible to use them for comparatively long periods of time to produce casts whose molten temperatures would be too high for good results in agar molds.

However, glue-gelatine molds are not extremely flexible and often must be reinforced with rigid backing mediums to prevent damage in handling. Further, after they are dehydrated with alum, they must be carefully protected with a lubricant such as soapstone before each individual casting is made. Therefore, when extensive production requirements prevail, it is generally desirable to use glue-gelatine molds for the production of plaster patterns on which more satisfactory metal-casting molds can be fabricated.

Flexible Mold Materials

Probably the best flexible mold materials for low-melt alloy casting are the elastomeric thermoplastics, which usually comprise highly plasticized polyvinyl chloride resins. In this category, the following compound is typical:

Polyvinyl chloride	5 parts
Tricresyl phosphate	25 parts
Basic lead carbonate	1 part
Wax	1 part

The ingredients are fused by mixing and heating to temperatures of 300 to 350° F, after which they may be cooled to about 270° F for casting on almost any type of pattern that will resist this temperature. If the pattern is made from a porous material, such as plaster, it should be carefully polished with linseed oil soap before the mold is cast. Metal and ceramic patterns may be used without special surface treatments, providing they are thoroughly clean.

A retaining wall should be used to surround the pattern when the molten thermoplastic material is poured; but, unless extremely large casts are to be made, it is not normally necessary to reinforce the solidified mold—which will have good tensile strength as well as excellent flexibility. The molten mold material should be thoroughly cooled and solidified within four hours after it is cast, regardless of its bulk. Then the mold should be separated from

(*Continued on page* 222)

For Better Core Sand Preparation the

clearfield MIXER

All types of core sand for all classes of castings can be prepared in one Clearfield mixer—prepared quickly, thoroughly and under accurate control.

Clearfield mixers, with the famous revolving pan principle of operation, are the most efficient sand preparing machines. Whether used individually or as part of a continuous system, the Clearfield will pay dividends in increased production, better quality, and lower unit costs.

There's a Clearfield mixer to meet your needs fully. Write today for catalog No. 79 for complete details.

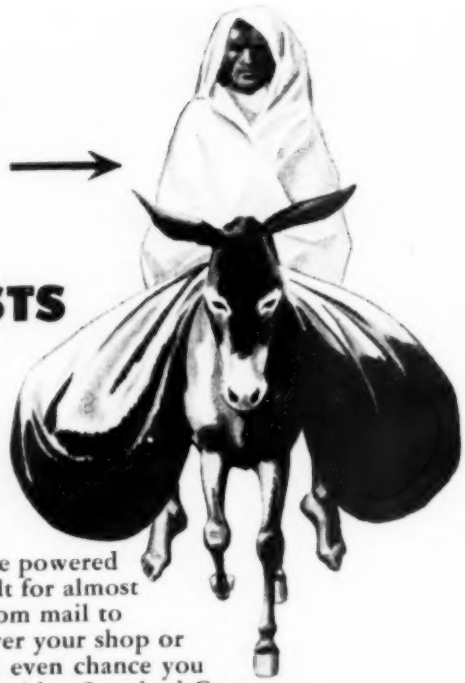
CLEARFIELD MIXER

MIXES, TEMPERS AERATES

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.

CONVEYORS LIKE THIS WON'T CUT YOUR COSTS



Looking for a way to get material from one part of your plant to another . . . you wouldn't consider the burro as the best answer. The real answer to fast, economical material handling is Standard Conveyors —a system, a section or a portable powered unit. Standard Conveyors are built for almost every material handling need, from mail to malleable iron castings. Look over your shop or warehouse, there's more than an even chance you can save time, money and labor with a Standard Conveyor. Standard Conveyor Company, General Offices: North St. Paul 9, Minn., Sales and Service in Principal Cities.

FREE HELPFUL LITERATURE

Send for Standard's Catalog. See how conveyors are used in every field of industry. Ask for Bulletin F-108.

Standard
GRAVITY & POWER
CONVEYORS

(*Continued from page* 220)

the pattern and used without lubrication or special surface treatments.

More than a thousand low-melt alloy castings can be made in a single elastomeric thermoplastic mold; and, after the mold becomes noticeably worn or damaged, the mold material may be remelted and recast. However, thermoplastic elastomeric molds are generally useful only when castings can be made at temperatures of 212° F or less.

Rubber-latex compounds are the only flexible mold materials that can be used to make castings at temperatures of as much as 300° F. While they are not as long-lived and reclaimable as elastomeric thermoplastic molds, they are extremely useful in producing certain types of casts. They include:

1. *Vulcanized latex materials suspended in solvents.* Compounds in this category are applied like paint, by brushing or spraying onto a pattern, and dried in open air—sometimes with a little heat. Successive coatings provide adequate mold-wall thickness, after which it is usually necessary to reinforce the mold with a rigid plaster retainer before castings can be made.

2. *Vulcanizable latex materials.* These compounds are liquids which must be mixed with accelerators and curing agents before they will solidify. After such mixing, they may be cast at room temperature—much the same as thermoplastic elastomers are cast at elevated temperatures. Then curing action may be accelerated by heating or allowed to take place slowly at room temperature.

The cavity surfaces of rubber-latex molds should be lubricated with light oil or a similar substance, before each low-melt alloy casting is made, and considerable care should be exercised in separating molds from patterns and castings in order to prevent damage to the former.

In preparing low-melt alloys for flexible mold casting, a clean iron pot should be used for heating purposes and heating action should be halted as soon as the material is thoroughly melted (since over-heating can cause undesirable oxidization in the material or ruin a good mold). Then, before the alloy is poured, it should be stirred vigorously.

After a molten alloy is poured into a flexible mold, a thin strip of metal or a fine piece of wire may be used to puddle the cast metal so as to break up air bubbles which could spoil the appearance of the finished part.

Flexible molds have no marked ten-

(*Concluded on page* 224)

MAXIMUM PRODUCTION in LIMITED FLOOR SPACE

DESPATCH Core Baking Oven

HERE'S HOW a critical production-floor space problem was solved for a midwest foundry with a DESPATCH Conveyor Oven:

- CAPACITY: 7000 lbs. per hour, 84 tons per day.
- FLOOR SPACE: 13 ft. wide by 52 ft. long.*

DESPATCH engineers designed this compact, horizontal, multi-pass oven of continuous-conveyor type 13′x52′ x27′ (high) to meet space and output requirements. Its platform-mounted heater, fans, gear boxes and controls permit core-makers to work on the floor below.

Coremen have convenient loading and unloading, with work space all around the moving carriers. There are 38 conveyor racks, each with 4 adjustable shelves for various-sized cores. Conveyor speed adjusts to variable baking time from 1 to 4 hours.

Loaded racks rise to top, then make two horizontal passes through baking chamber. Third pass travels through built-in cooling section, where fumes are exhausted and cores quickly cooled by special fans.

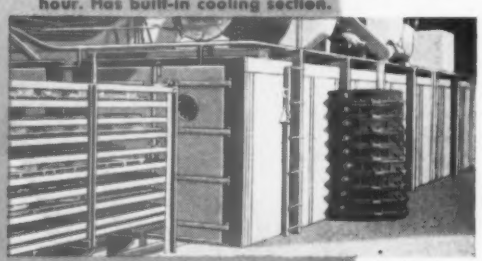
Baking is *fast* and *uniform* with forced convection heat, horizontal air flow and automatic controls. A combination direct-fired gas-oil heater provides 3,000,000 BTU per hour, with 25% overload possible. Temperatures average 450-550°F., with 650° F. maximum. Heat is circulated by a powerful 23,000 CFM fan, with 75% recirculation.

*Available in most any size and capacity

Advantages

- Bakes uniformly.
- Speeds handling.
- Built rugged; heavy insulation.
- Cuts baking time.
- Eliminates rejects.
- Efficient, economical, dependable.
- Cuts corebaking costs.
- Operates automatically.
- Easy to install.

VERTICAL CONVEYOR oil-fired Despatch Oven. Bakes up to 5000 lbs. of large or small cores per hour. Has built-in cooling section.



INTERMITTENT CONVEYOR (on floor) pulls load-racks thru 40′ chamber. Bakes 4800 lbs. cores per hour. Has large, dual, oil-fired heaters.

CAR-LOADED OVEN with combination gas or oil-fired heater. Bakes up to 40 tons per batch. Models available up to 200 tons per charge.

Write Today for Bulletin J-30 on DESPATCH Conveyor Foundry Ovens.

DESPATCH OVEN CO.
MINNEAPOLIS OFFICE: 619 Southeast 8th St.
CHICAGO OFFICE: 221 North LaSalle St.
Offices in All Principal Cities

DESPATCH OVEN COMPANY

SPECIAL LUMBER AND FABRICATED WOOD PRODUCTS FOR FOUNDRIES, FROM DOUGHERTY LUMBER

FLASK LUMBER

Flask lumber or completed flasks, cut to specifications. Any dimension, any type—built to your own particular requirements.

- BOTTOM BOARDS that stand up under rough, continuous service. Standard and special sizes.
- FILLETS, feather-edged to save time. 1/4" to 2" size, three-foot lengths.
- DOWELS of sturdy hardwood, from 3/16" diameter.
- CRATING LUMBER, in random lengths or cut to size.
- PALLETS, made to order...made to simplify your "moving" jobs.
- ROLLERS to make the movement of "big stuff" a simple operation.
- SKIDS, in special and stock sizes.
- BENCHES built to your specification. Steel legs, working surface of maple flooring.
- TOTE BOXES, in any size and any design you require.

Phone Diamond 1200

THE DOUGHERTY LUMBER CO.

CLEVELAND 5, OHIO

CALL YOUR LUMBER NUMBER, DIAMOND 1200, FOR OVER-THE-PHONE OR PERSONAL HELP FROM LUMBERMEN WHO KNOW FOUNDRY-PROBLEMS!

(*Concluded from page* 222)

dencies to chill cast alloys, although the latter will solidify with maximum speed adjacent to the mold surfaces. Therefore, it is often possible to make hollow castings without cores simply by pouring off molten alloy in the center of a cavity after the material adjacent to the cavity surfaces has had time to harden.

In most cases, a low-melt alloy casting should be allowed to cool to room temperature before it is removed from a flexible mold. However, a cold-water quench may sometimes be used to accelerate the cooling action after the cast metal has solidified so that there will be no danger of blow holes.

SPECTROPHOTOMETRIC ANALYSIS OF GRAY IRON

(*Continued from page* 93)

ence of an associated element or compound of greater or lesser absorption characteristics, and had better be corrected.

The combined method utilizes the strong dehydrating and oxidizing properties of perchloric acid. With this acid, the graphite (free carbon) of an ordinary cast iron can be eliminated, and this is essential when phosphorus and chromium are to be determined. It will be found that very soft irons, of high graphitic carbon content, require more perchloric acid than harder irons. An analyst soon discovers the appropriate acid volume for the purpose. In this procedure, volumes of acid are given for average irons. Present work indicates the value of finely crushed chilled pins as being the best of all possible iron samples for the combined method. Such samples can shorten the time between melting and analysis.

Procedure—Silicon and Parent Solution: To a 1-gram sample in a 400-ml beaker, add 5 ml nitric acid, 1-1. Allow initial effervescence to complete itself cold, then add 20 ml perchloric acid, 72 per cent. Heat strongly, covered with cover glass, until graphite is entirely eliminated and solution becomes mushy. Remove before it becomes dry, and cool. Dissolve crystalline mass in about 20-30 ml hot water, filter through #1 H Whatman paper, catching filtrate in a 200-ml pyrex volumetric flask. Scrub beaker with policeman and

(*Continued on page* 226)

NUMBER 4 IN A SERIES EXPLAINING WHY

DUSTUBES COST LESS TO MAINTAIN AND OPERATE

Better Dust Removal
SIMPLE, FAST, THOROUGH
SHORTENS CLEANING TIME

Filter Replacement
TAKES ONLY A FEW SECONDS
REQUIRES NO TOOLS

Dustube Filters
NO ABRADING METAL CONTACT
EASY TO SHIP, STORE, HANDLE

Power Savings
LOWER RESISTANCE TO AIR FLOW
LOWER AIR VELOCITIES

High Efficiency
NEARLY 100% EFFICIENT
BY CONVINCING TESTS

Ease of Inspection
CLEAN, SAFE, SIMPLE
NO PARTS TO REMOVE

FAST THOROUGH REMOVAL OF ACCUMULATED DUST

The Dustube shaking mechanism proves its profit-building value when it's time to release accumulated dust. Here's why:

It Cleans Thoroughly. The tubes are shaken while deflated, limp, loose, and completely subject to the combined vertical and horizontal movement imparted by the shaker. This causes the entire tube to flex from normal circular shape, and effectively releases all dust within the tube.

It Cleans Quickly. Dust falls immediately into a storage hopper . . . never upon tiers of dust cells that lie directly underneath, as in some systems—a condition that multiplies the work and increases cloth wear, power requirements, and down time. In most cases it is not necessary to operate the Dustube shaker longer than two minutes. (Where no down time is permissible Dustubes can be arranged for continuous operation).

Add to these advantages Dustube's high efficiency, low cost maintenance and operation and you'll see why we say, "When you invest in a dust collector, investigate Dustube."

Write for your copy of Catalog 72-A. It explains in detail the advantages of Dustube design.

American
THE AMERICAN MOLDER
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St., Mishawaka 2, Indiana

dustube
DUST COLLECTORS

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS" ANTI-PIPING COMPOUND "B"

For use in Iron and Steel Foundries to:

...reduce the depth of the pipe, without causing segregation, in the production of castings and ingots.

...is practical for both small and large castings and ingots because it is important that the castings be properly fed and have uniform grain structure regardless of the size of the finished product.

...will cause no change in chemical analysis because there are no elements in the compound that will cause contamination.

...it is easy to handle because it is a powder and is suitably packed in metal containers.

WRITE FOR COMPLETE DETAILS

NIAGARA FALLS
Smelting & Refining Division
Continental-United Industries Co., Inc.
BUFFALO 17, NEW YORK

(*Continued from page 224*)

wash out with hot water. Remove all silica gel. Wash paper well three times with hot water, catching all in flask. Remove flask before proceeding further, and discard subsequent washes. Wash twice with hot 10 per cent hydrochloric acid, and then twice with hot water. Remove paper and contents to a crucible, and ignite at 1600°F, for half an hour. When cool, weigh ash as silicon dioxide.

If silicon alone is to be determined, only 10 ml perchloric acid 72 per cent are added after nitric acid, a 150-ml beaker partly covered to accelerate evaporation can be used, and of course, it will not be necessary to preserve the filtrate. The yellowish appearance of the silica ash after ignition should occasion no concern. Very small traces of chromium are effective coloring agents of silica.

The solution in the 200-ml flask, properly diluted and mixed, becomes the parent solution, furnishing aliquots for subsequent determinations.

Manganese: Transfer a 20-ml aliquot from the parent solution to 100-ml pyrex volumetric flask. Add 10 ml bright Larabee acid solution, heat to boil, remove, swirl gently and add 15 ml ammonium persulphate, 25 per cent. Replace on hot plate and heat until bubbles become coarse. Remove, cool slowly, dilute to 100 ml, and observe transmission at 550 millimicrons using water as a reference. This method performs well on concentrations up to 1.36%. Proper aliquots could conceivably be used for higher concentrations. As a slight blank exists in this determination, a correction is necessary if smaller aliquots are taken.

Solution: Bright Larabee Acid.		
H_2O		1260 ml
$AgNO_3$		10 grams
H_2SO_4	conc.	240 ml
H_3PO_4	85%	300 ml
HNO_3	conc.	600 ml

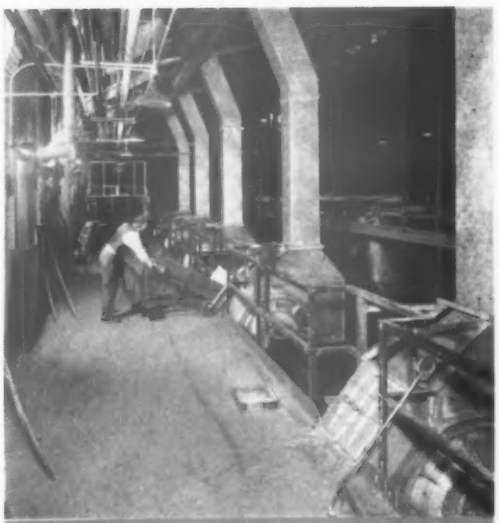
Phosphorus: Transfer a 10-ml aliquot from the parent solution to a 100 ml pyrex volumetric flask. Add 10 ml perchloric acid 10 per cent, mix and add 10 ml sodium sulphite 10 per cent. Heat gently without boiling for about five minutes, then bring to a boil. When clear, water white, and boiling, remove, swirl gently and add 30 ml ammonium molybdate-hydrazine sulphate solution. Replace, heat almost to boiling for 10 minutes. Bring to a boil, but do not boil. Cool, dilute to 100 ml. Determine transmission at 670 millimicrons using water as a reference. This method is effective for concentrations

(*Continued on page 228*)

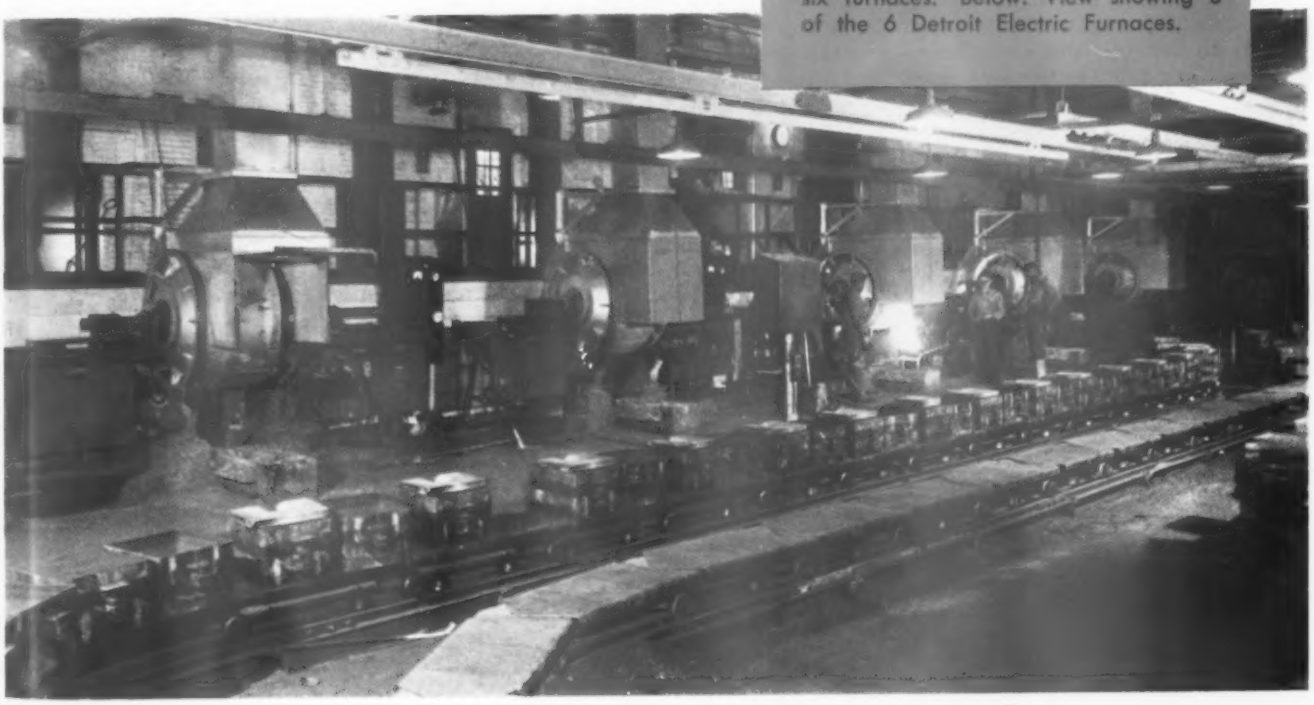
One man operates six DETROIT ELECTRIC FURNACES producing up to 6000 lbs. per hour

If faster and cheaper melting of higher quality metal interests you, take a look at this layout of Detroit Rocking Electric Furnaces that melt bronze for hydraulic pressure castings in a large eastern foundry. With only 1 man at the controls, these six Type LFY, 700 lb. capacity Detroit Electric Furnaces *can produce 6,000 lbs. of bronze per hour.* Two 2-man gangs handle the pouring. One man using 700 lb. capacity trucks on an elevated platform charges all six furnaces from the rear. Three furnaces feed bronze to the continuous mold conveyor; the remaining three are used for miscellaneous sand castings. Less time, less labor, more metal —*and note this money saving fact:* 25% of the total charge is borings and turnings which were formerly sold as low value scrap.

Detroit Electric Furnaces melt ferrous and non-ferrous metals. They are made in capacities from 10 to 8000 lbs. Our engineers can suggest specific models and layouts that *will simplify and speed metal melting* in your plant. Write for complete facts.



Above: View of rear charging platform showing single charger loading one of six furnaces. Below: View showing 5 of the 6 Detroit Electric Furnaces.



DETROIT ELECTRIC FURNACES

DETROIT ELECTRIC FURNACE DIVISION • KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

FOREIGN OFFICES: BIRLEC, LTD., Birmingham, England, Representative for Europe and British Commonwealth excluding Canada. EQUIPAMENTOS INDUSTRIAS "EISA" LTD., Sao Paulo, Brazil, Representative in Brazil. M. CASTELLVI, INC., 150 Broadway, New York 7, N. Y., Representative in Chile, Argentina, Peru, and Venezuela. CASA COVACEVICH, Mexico City, D. F., Mexico.

(*Continued from page 226*)

up to .500 per cent. Above this value, up to a theoretical 1.000 per cent, a 5-ml aliquot is necessary. A weakness exists in the region below .050 per cent which can be corrected by using a 20-ml aliquot. As there is no perceptible interference of the nature of a blank, no compensation will be necessary.

Solutions:

Ammonium Molybdate-Hydrazine Sulphate.

1. Ammonium Molybdate
   H_2O 500 ml
   H_2SO_4 conc. 300 ml
   Ammonium Molybdate 20 grams.
   Cool, dilute to 1 liter.
2. Hydrazine Sulphate, 1.5 grams dissolved in liter H_2O. To use, to 65 ml water add 25 ml Ammonium Molybdate solution and 10 ml Hydrazine Sulphate solution. Make up fresh before use.

Nickel: Transfer 10-ml aliquot from parent solution to a 200-ml volumetric flask. Add in rapid succession, shaking well after each addition, 20 ml tartaric acid 10 per cent, 10 ml bromine water, 10 ml ammonium hydroxide conc., 8 to 10 ml dimethy glyoxime 1 per cent. Wait one minute, then add 10 ml sodium hydroxide 25 per cent. Dilute immediately to 200 ml. Determine transmission at 530 millicrons, using water as a reference, after 20 minutes.

This method is useful in the range 0 - 2.00 per cent. Perhaps, to avoid complications, it is better practice to reduce the size of the aliquot to 5 ml for concentrations over 2.00 per cent, rather than to increase the final dilution of a 10-ml aliquot. If the final dilution is greater than 200 ml, it is necessary to preserve the proportions of the reagents to the final volume. Thus, a volume of 500 ml would require 50 ml tartaric acid 10 per cent, etc.

Solutions:

Dimethyl Glyoxime, 1 per cent in use, with satisfactory results.

Chromium: Transfer 10-ml aliquot from parent solution to a 200-ml volumetric flask. Add 125 ml cold water, and 20 ml 2 N phosphoric acid. Mix, add 20 ml diphenylcarbazide solution and fill flask to mark with water. Mix well, and determine transmission after 20 minutes at 530 millimicrons, using water as a reference. This aliquot proportion is effective up to .60 per cent. If the concentration is higher, a choice must be made between a smaller aliquot (5 ml) or greater dilution. If the latter, addition of 2 N phosphoric acid must be in such relation that the acidity of the final volume becomes .2 N on dilution. It is also well to maintain the ratio of diphenylcarbazide to the final solution.

Sandel maintains that .2 normality with sulphuric acid in the final solution is essential to obtain color permanency, and that phosphoric acid causes fading. It has been found that the reverse is true, sulphuric acid in any concentration inducing bleaching while phosphoric acid results in remarkable permanency. Acid concentration is not so critical that additions cannot be made with ordinary graduates.

Solutions:

2 N Phosphoric Acid:

Dilute 400 ml Phosphoric acid to 1000 with water.

Diphenylcarbazide:

s-Diphenylcarbazide, .01 grams in 5 ml methyl alcohol, dilute to 20 ml with water. Use fresh. Care must be taken to use vessels well washed with distilled water in making up this solution. If it becomes red on dilution with water, discard and make up anew.

Where chromium is to be determined with better than routine accuracy, or where its concentration is above 1.00 per cent, it is necessary to eliminate silica with hydrofluoric acid, a few drops of which are added to the warmed initial nitric acid solution of the sample. When reaction ceases, 20 ml perchloric acid 72 per cent is added and solution brought to boil. A cover glass is placed on beaker when HF fumes are no longer evolved. The solution is heated to the mushy stage as previously described, but does not require filtering. Of course, silicon cannot be determined.

Contamination of silica by chromium has been found to be too slight to be noticeable in the lower ranges of chromium. It has been noticed that frequently the hydrofluoric acid removal of silica leaves enough of that material present to affect subsequent phosphorus determinations. In other words, silica removal by filtration is to be preferred for ordinary purposes.

Molybdeunm: To a 10-ml aliquot in a 50-ml volumetric flask add successively, with agitation, 10 ml potassium thiocyanate solution, 10 per cent, 10 ml stannous chloride solution, and dilute to mark (or slightly above, to be determined by experience) with sulphuric acid solution, 1-6, freshly mixed and hot. Cool and determine transmission after 20 minutes at 470 millimicrons. Concentrations up to 1.00 per cent molybdenum can be determined in this manner.

Solutions:

Stannous Chloride solution:

Stannous Chloride 112 grams, dissolved by warming with 100 ml Hydrochloric acid, and diluted to 1000 ml.

Sulphuric Acid 1-6.

To 30 ml water add 5 ml H_2SO_4 and use immediately.

The use of the combined method and the spectrophotometer in the routine iron control laboratory brings us closer to the time when the melter will be familiar with yesterday's analyses, before melting today's iron.

(*Concluded on page 230*)

CASTINGS DISPLAY: At the recent "Made in Racine Centennial Exposition" held in Racine, Wis., Iroquois Foundry Co., Racine, displayed a representative line of castings it produces, and in addition also showed the end use of each casting by obtaining from its customer a finished machine or a detailed picture.

Controlled Uniformity

IN

Smith L-O Core Oil

Whether you receive a shipment today, a month from now, or next year, you are assured of receiving a product of absolute uniformity. We are able to support that claim because Smith L-O Core Oil is the *only core oil* produced by the Dow-Therm indirect heat application method, plus a rigid inspection of each batch, both physically and chemically, in our modern sand control laboratory. This Dow-Therm patented system — which makes direct fire methods obsolete — enables us to keep a rigid check on each phase of preparation ... the end result being a core oil that is completely homogeneous and consistently uniform in every detail.

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. — Reading, Pennsylvania
- FOUNDRY SERVICE CO. — Birmingham, Alabama
- E. R. FROST CO. — Minneapolis, Minnesota
- MARKET TERMINAL WAREHOUSE — Buffalo 4, New York
- MALCOLM G. STEVENS — Arlington, Massachusetts
- TERMINAL WAREHOUSE — Worcester 8, Massachusetts
- TOMKINS TIDEWATER TERMINAL — South Kearny, New Jersey
- M. W. WARREN COKE CO. — St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. — Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. — Portland 14, Oregon

MOLDED TO PERFECTION!

Smith L-O Core Oil

CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

Reduce Scrap Loss in Pressure Castings-

with

Milwaukee

Thread Stem Chaplets

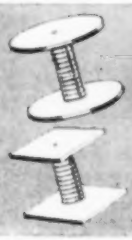
The design of these chaplets insures complete, thorough fusing in any casting . . . a vital factor in reducing scrap loss due to "leakers."

This *complete fusion* is assured by the many sharp, coarse rings . . . having a larger diameter than the stem itself . . . which run from head-to-head on Double Head Chaplets. The use of Milwaukee Thread Stem Chaplets permits a heavier stem than would otherwise be possible. This results in the added benefit of a well secured core as well as a pressure-tight casting.

Milwaukee Thread Stem Chaplets are used extensively in all types of castings subject to gas, steam, oil or water pressure where leakage means "scrap." They are made of low-carbon steel, coated for rust-proofing . . . in any lengths, stem diameters and head sizes. They cost no more than ordinary chaplets. Pure aluminum Thread Stem Chaplets are available in small sizes.

Manufacturers of the Milwaukee-Tessmer Sprue Cutter for Non-Ferrous Castings.

MILWAUKEE CHAPLET & MFG. CO.
1025 S. 40th STREET, MILWAUKEE 4, WISCONSIN



MILWAUKEE CHAPLET

(*Concluded from page 228*)

We owe much to Sober's ingenuity and originality in opening this new field. The writer is personally indebted to Clinton Moore, of the Cooper-Bessemer Corp., Grove City, Pa., for his valued advice, and to H. C. Wintz, formerly metallurgist at the Buffalo Works of the Worthington Pump & Machinery Corp., whose patience, kindness and generosity made possible the necessarily extended investigations.

ALUMINUM ALLOY CASTINGS

(*Continued from page 75*)

the American Society for Testing Materials[2] stipulate that "the finished castings shall be uniform in composition and as free from blowholes, cracks, shrinks, and other injurious defects as the best commercial practice will permit." These specifications also stipulate the mechanical properties that should be developed in test bars cast at the same time as the castings poured from the same heat, and heat treated with the castings where heat treatment is required.

In regard to dimensional standards, the ASTM specifications state: "The responsibility of furnishing castings that can be laid out and machined to the finished dimensions within the permissible variations specified, as shown on the blueprints or drawings, shall rest with the manufacturer, except where pattern (or mold) equipment is furnished by the purchaser. Sufficient stock shall be allowed for shrinkage and, where required for finishing; but castings of excessive size or weight shall not be furnished."[2,3] Chemical compositions of the various types of alloys also are specified (see Table III of article 2 of this series, THE FOUNDRY, January 1948).

Rigid standards of quality were incorporated in the various governmental specifications governing the acceptance of aluminum alloy castings for military use during the war, particularly those used in aircraft. Some of these specifications called for "perfect" castings and thus were extremely difficult to meet. X-ray inspection was required in varying degrees, in order to examine the castings for internal discontinuities such as porosity, entrained gas holes, and dross inclusions.

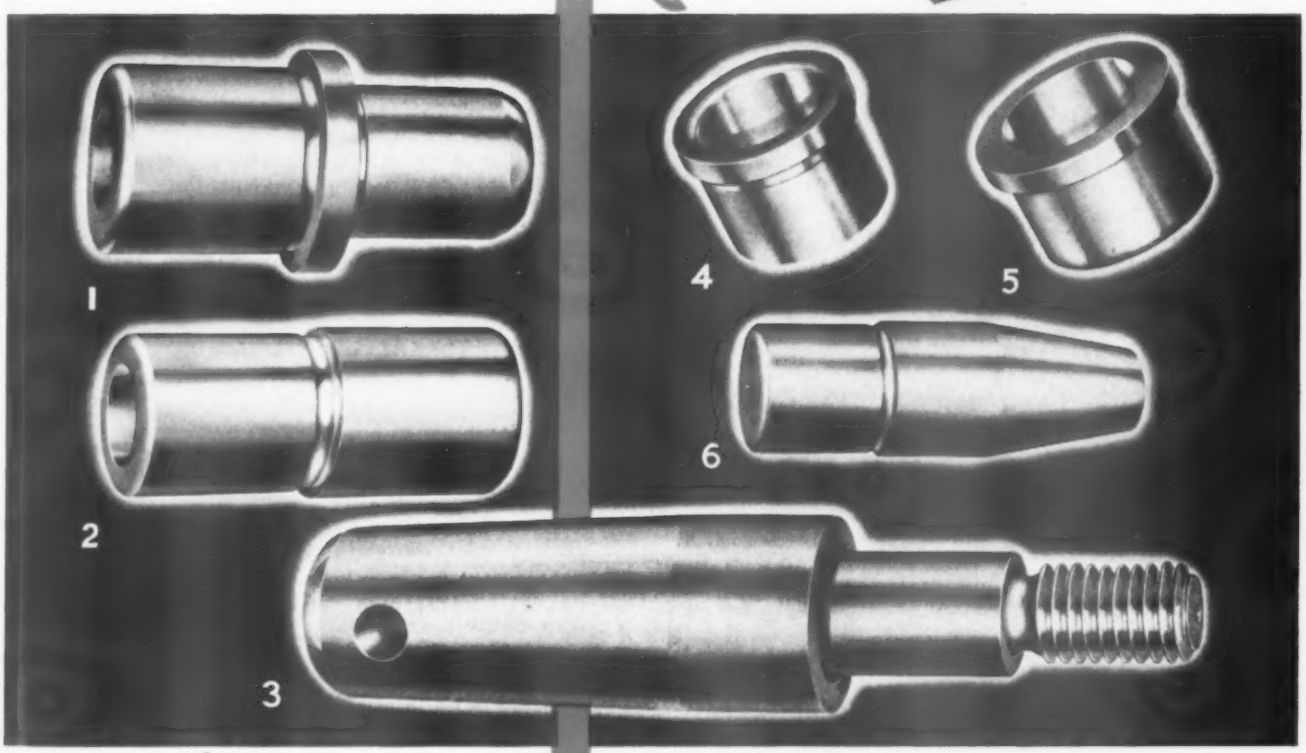
Some highly stressed castings for peacetime use, such as those used for structural parts of commercial aircraft, must continue to meet the same standards of perfection as those pro-

(*Continued on page 232*)

For accurate line-up of cope+drag

UNIVERSAL FLASK PINS AND BUSHINGS

Many of the cope and drag problems encountered in all foundries *are effectively solved* with the use of Universal Flask Pins and Bushings. Whether cast iron, aluminum or steel flasks are used, these modern foundry accessories *insure positive alignment, make possible new production speed.* Hardened and ground for longer life, they are available from stock in various standard sizes and shapes. Special sizes made to order. Write for complete catalog.



1. Shoulder Flask Pin
2. Plain Flask Pin
3. Plate Pin
4. Round Flask Bushing
5. Elongated Flask Bushing
6. Double Match Plate Pin

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

It pays to know where the weld should be!

A LIFTING MAGNET, when properly designed, is a long term investment. You can look into a magnet's future *simply by looking into its construction.*

For instance, look at a welded lifting magnet. Where is the weld? Obviously it should be ON TOP OF THE MAGNET where it cannot be damaged by hard knocks.

Only new Ohio PROTECTO-WELD Magnets offer you this advantage. Outer ring and top plate are welded together ON TOP OF MAGNET. Thus, the weld is never dented in, retains its shape permanently. You can turn down the weld for magnet disassembly without cutting away outer ring... without destroying outer pole.

It pays to know where the weld should be! And it pays to *standardize* on Ohio lifting magnets. They operate cooler... lift bigger loads all day long ...cost less to maintain... last years longer. Sizes? 39, 46, 55 and 65 inches diameter. For details, write today to Ohio—*leader in magnetic materials handling.*

Ohio is also a leading name in the small motor industry

Ohio MAGNETS

THE OHIO ELECTRIC MFG. CO.

5910 MAURICE AVE. • CLEVELAND 4, OHIO

(*Continued from page* 230)

duced for military use; these will continue to require 100 per cent x-ray inspection. A second class of castings might be those that are moderately stressed where failure would not involve loss of life or serious interruption of work[4] These castings would be produced under x-ray control; but after standards are established and production begun, no further x-ray control need be used except as required periodically for inspection check purposes.

A third class of castings might be the normal commercial castings which are under low stress and in nonstructural applications. No x-ray control should be needed for such castings. This does not mean that they should be carelessly manufactured. Each casting should be made as good as the foundry knows how to make it; but the large majority of commercial castings are entirely satisfactory for their purposes if they meet reasonable visual inspection standards, and high-cost inspection and quality-control procedures should not be applied where they are not justified.

Inspection Methods—The purpose of any inspection program obviously is to determine whether the castings produced meet the established standards of quality. For any given casting, therefore, the particular inspection method or methods used will be governed by the requirements the casting must meet. For the large majority of commercial castings visual methods are entirely adequate. Highly stressed castings or castings that must meet special requirements will need to be inspected in such manner as to determine whether they will fulfill those requirements.

Regardless of the casting method used and of the care excercised in handling and processing the metal in the foundry, it is practically impossible to produce castings without at least some minor discontinuities. For the majority of applications, however, many of these minor imperfections fortunately do not impair the usefulness of the castings and therefore should not be cause for rejection. Proper interpretation of inspection results requires the exercise of a great deal of good judgment in distinguishing between castings that will satisfactorily meet the customers' requirements and those that will not.

Five general methods of inspection are in common use:[4]

1. Visual examination
2. Pressure testing
3. X-ray examination
4. Chalk and ultraviolet testing
5. Etching

Visual Examination: As the name

(*Continued on page* 234)

FREMONT

MAGNESIUM FLASKS

ACCURATE-LIGHT-STURDY

FREMONT
CAST IRON JACKETS

All Orders Given Very Prompt Attention

BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

(*Continued from page 232*)

implies, visual inspection is simply inspection of the castings by eye with or without the aid of some instrument. A magnifying glass often is used to aid in examining the casting surface, and measuring instruments, of course, are required in checking dimensions.

In the majority of foundries, hot and final inspections are made. The castings are examined for the more obvious surface imperfections immediately after removal from the molds and therefore while still hot. A thorough visual inspection follows after the trimming and finishing operations, including the required dimensional check. On large production runs, the dimensional inspection often is facilitated by use of a fixture or jig of the "go-no go" type.

Pressure Testing: A pressure test is required of all castings that must be leakproof or pressure-tight. Pressure tests usually are made by sealing off the internal cavities or cored out passages in a special jig with means for introducing compressed air into the interior. After air pressure has been built up, pressure tightness is determined by either immersing the whole assembly into a tank of water or by applying a water-soap solution to the exterior. In either case, any leaks will be revealed by bubbles appearing on the surface of the casting. For any given casting, testing pressure, allowable seepage, and other conditions of the test usually are incorporated into the casting specifications.

X-Ray Examination: Standard methods of x-ray examination, or radiography, as used for inspection of other metals and materials are applicable also to aluminum castings. The type of apparatus required will depend on the section thickness to be examined, a 140-kilovolt machine being adequate for thicknesses up to 2 inches. Associated equipment required for x-ray testing includes a darkroom and photographic processing equipment, an illuminator, cassettes, film markers, penetrameters, and stamping stencils. Films having high contrast are most suitable for x-raying aluminum castings. In addition, suitable precautions must be taken to protect testing personnel from harmful amounts of radiation.

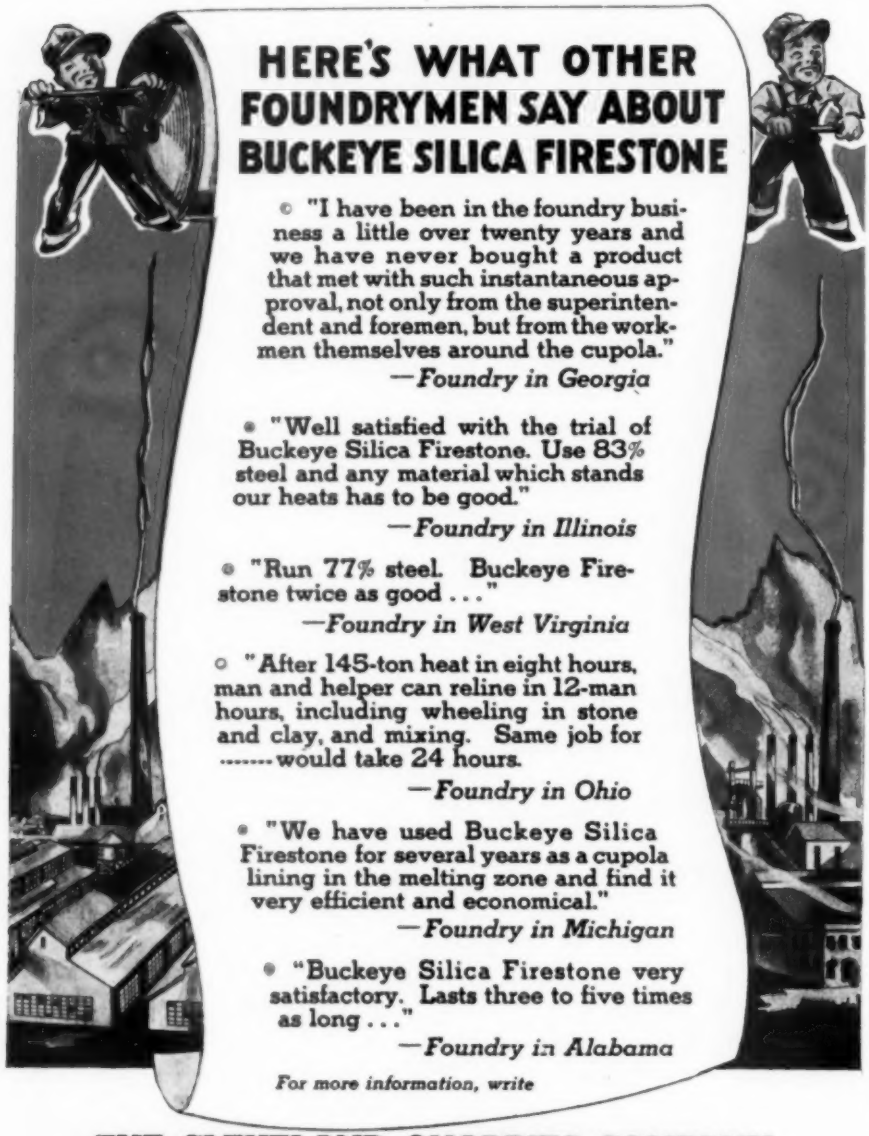
Machine Adjusted for Test

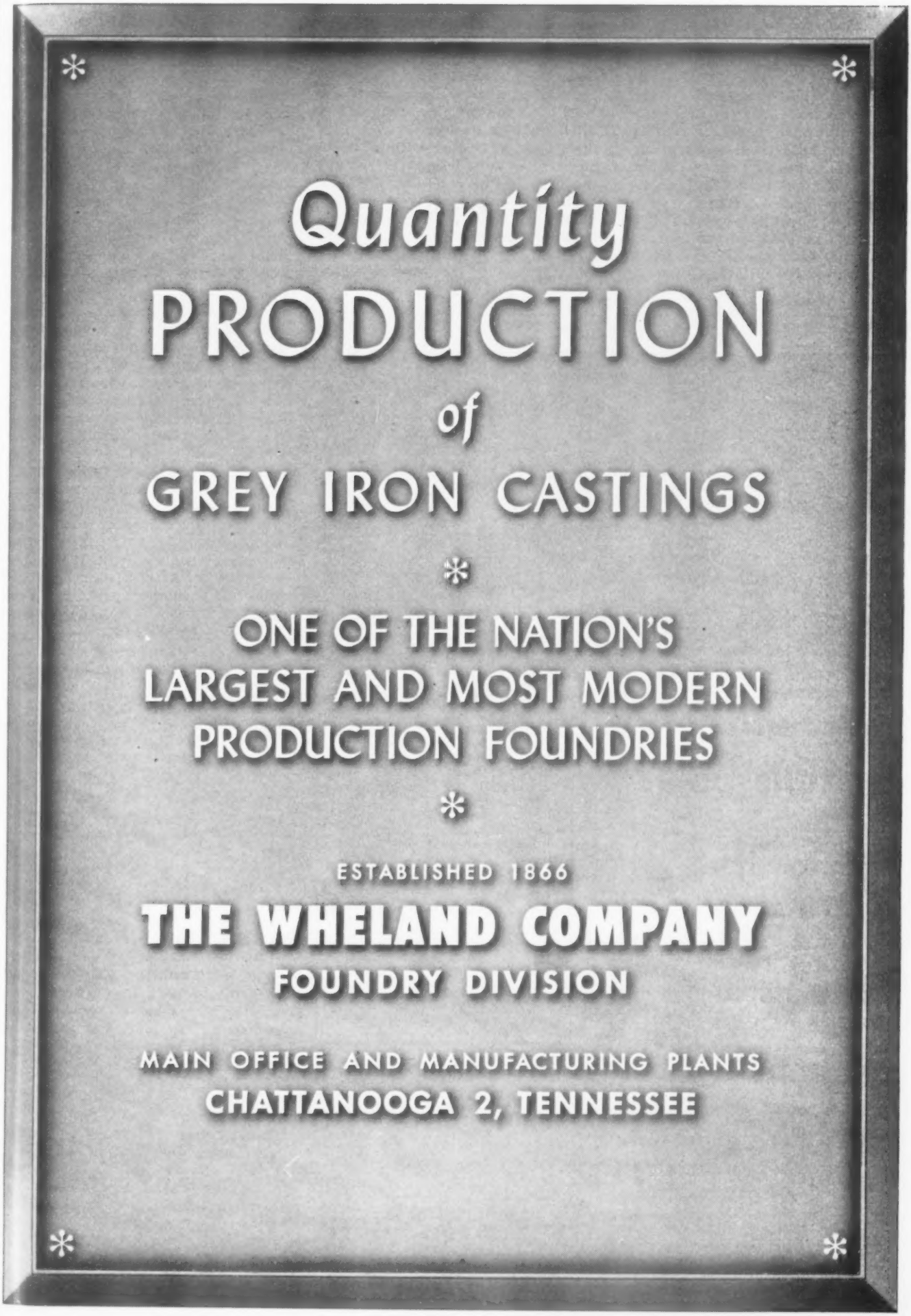
In operation, the casting under test usually is placed on a table directly over a photographic film enclosed in a suitable holder, or cassette. The x-ray machine is then adjusted so that the rays pass through the casting to the film. Any discontinuities within the metal affect the intensity of the rays reaching the film and thus produce variations in the density of the photographic image. Cavities are registered as darker areas and heavy inclusions as lighter regions. The x-ray method may be used also for visual inspection by replacing the photographic film with a fluorescent screen and arranging the setup for convenient viewing.

X-ray inspection is used also in determining the soundness of welds. It is desirable to obtain a view of the metal on both sides of the weld, especially with welds in thin sections or where the metal thickness on one side of the weld is different from that on the other. When x-ray inspection is used for welds only, care must be exercised to avoid rejecting castings on the basis of minor discontinuities discovered incidentally in areas adjacent to the welds.

Comparison with radiographs of acceptable and rejectable units usually is helpful in determining whether to accept or reject a given casting or weld. Good judgment based on sound experience is the best guide in proper-

(*Continued on page 236*)


HERE'S WHAT OTHER FOUNDRYMEN SAY ABOUT BUCKEYE SILICA FIRESTONE
"I have been in the foundry business a little over twenty years and we have never bought a product that met with such instantaneous approval, not only from the superintendent and foremen, but from the workmen themselves around the cupola."
—Foundry in Georgia
"Well satisfied with the trial of Buckeye Silica Firestone. Use 83% steel and any material which stands our heats has to be good."
—Foundry in Illinois
"Run 77% steel. Buckeye Firestone twice as good . . ."
—Foundry in West Virginia
"After 145-ton heat in eight hours, man and helper can reline in 12-man hours, including wheeling in stone and clay, and mixing. Same job for ..... would take 24 hours.
—Foundry in Ohio
"We have used Buckeye Silica Firestone for several years as a cupola lining in the melting zone and find it very efficient and economical."
—Foundry in Michigan
"Buckeye Silica Firestone very satisfactory. Lasts three to five times as long . . ."
—Foundry in Alabama
For more information, write
THE CLEVELAND QUARRIES COMPANY
1740 East Twelfth St. CLEVELAND 14, OHIO
BUCKEYE
"FOR THAT EXTRA SERVICE"
SILICA FIRESTONE


Quantity
PRODUCTION
of
GREY IRON CASTINGS
ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES
ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION
MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

(*Continued from page* 234)

ly interpreting the results of x-ray inspection as in many other foundry operations.

Chalk and Ultraviolet Testing: Complementary to x-ray inspection which reveals internal discontinuities, chalk and ultraviolet tests reveal surface defects that may not be discernible visually. Both methods involve submerging the castings to be checked in a bath of penetrant oil as the first operation. After removal from the bath the excess oil is cleaned from the surface of the casting. The process is more effective when either the castings or bath are heated. If a water soluble oil is used, the excess oil may readily be removed by a hot water wash.

In chalk testing, the cleaned and dried castings then are dusted with dry chalk or coated with a liquid chalk spray and dried. Oil remaining in cracks or voids that are open to the surface of the castings will darken the chalk in the areas where such imperfections exist. The difficulty of clearly distinguishing between wet and dry areas of chalk have made the method somewhat difficult to use.

The ultraviolet or so-called "black light" method is similar except that the penetrant oil contains a fluorescent dye and the castings after being coated with chalk are examined under ultraviolet radiation or "black light." Fluorescence of the oil brought to the surface by the chalk clearly indicates the location and nature of any surface discontinuities.[3] Any of several commercially available lamps furnishing near ultraviolet radiation with little visible light may be used.

Many surface imperfections revealed by chalk and ultraviolet tests are quite superficial and thus may readily be removed by simple hand filing or scraping. In fact, there is a tendency for these methods to overemphasize surface irregularities that are entirely unobjectionable for most casting applications. Because the proper interpretation of the test results is therefore sometimes difficult, chalk and ultraviolet tests are not regularly used in production foundry work. However, they have proved to be valuable laboratory tools in some instances in both casting development and foundry control.

Etching: This process, which may be applied either to local areas or to entire castings, consists of etching the castings in a 5 per cent solution of hot caustic soda followed by a water rinse. The resulting smudge is removed by a 5 to 10 per cent commercial nitric acid solution followed by a water rinse.

The proper interpretation of results obtained with this process is sometimes difficult. Use of the process may result in intergranular attack or exaggerate microporosity, and it is sometimes difficult to distinguish between these effects and casting imperfections. Therefore, proper control should be exercised over the several variables involved in the method.

Salvage Methods — Many castings that do not initially pass inspection may be salvaged, thus reducing the number that must be scrapped and remelted. The four principal methods of salvage are: (1) welding, (2) impregnation; (3) peening, and (4) blending.[4]

Welding: Although the majority of aluminum casting alloys may readily be welded, aluminum requires a technique somewhat different from that used with iron and steel. Both electric-arc and gas-torch welding are employed, the latter being more common. Gas welding of both the oxyacetylene and oxyhydrogen types have been used, and more recently atomic-hydrogen welding has been

(*Continued on page* 238)

A Foundryman* tells us— How he cuts grinding costs

The STEARNS GRINDER Holding Magnets installed in our foundry have enabled us to reduce costs more than 30% in overall grinding time by eliminating the use of jigs, clamps, wedges and other devices normally needed for grinding castings, etc.

All we have to do now is lay the casting on the magnet, trip the switch and the work is held securely and safely.

Maintenance cost is negligible and these magnets are performing so satisfactorily that we intend to add several more to our present grinder holding magnet set-up.

*Name on Application

East tilting trunnion available in various sizes for applications requiring angle grinding or positioning of work.

Operates on D.C. voltage, wound to suit your requirements. Hand or foot switch optional. A very flexible job that will definitely improve your swing grinding operation. A strong powerful magnet of rugged design and construction for tough work.

STEARNS MAGNETIC
Manufacturing Company
662 So. 28 St. Milwaukee 4, Wis.
PULLEYS — DRUMS — SEPARATORS — MAGNETS

FOR EVIDENCE of CARL-MAYER OVEN SATISFACTION

Read our Mail

Letters like this, and we have many of them, prove that Carl-Mayer oven design contributes greatly to improved core room results. Carl-Mayer Patented *(Pat. No. 2,257, 180)* Recirculating Heating System, obtainable only on Carl-Mayer Ovens, assures unusually fast and uniform baking with amazing fuel economy. Carl-Mayer design also keeps working conditions *comfortable* because heat and fumes are removed from the cores before they reach the unloading zone.

High grade construction keeps maintenance *low.*

WRITE FOR BULLETIN showing the extensive line of Carl-Mayer Core and Mold Ovens.

Union Brass & Metal Manufacturing Company

INCORPORATED 1882

PLUMBERS BRASS GOODS

Telephone Humboldt 1331 — 501 West Lawson Avenue — Saint Paul 3, Minnesota

April 9, 1947

Mr. C. F. Mayer, President
The Carl Mayer Corp.
3030 Euclid Avenue
Cleveland 15, Ohio

Dear Mr. Mayer:

We are very much pleased to enclose two copies of a photograph showing your core oven and our core room layout. The gentlemen in the picture reading from left to right are our Sales Manager and Secretary, Mr. George F. Gerlach, and our President and General Manager, Mr. Henry J. Michel.

Since this picture was taken, we have added two core blowing machines. They are approximately directly under the receiving tanks which are shown in the picture.

As you probably know, our new core room was laid out on paper and a building constructed to house this new equipment. We are very proud of our new core room and would be more than glad to show it to you or to any one interested.

The oven is operating beautifully, and we are very much pleased with the results so far.

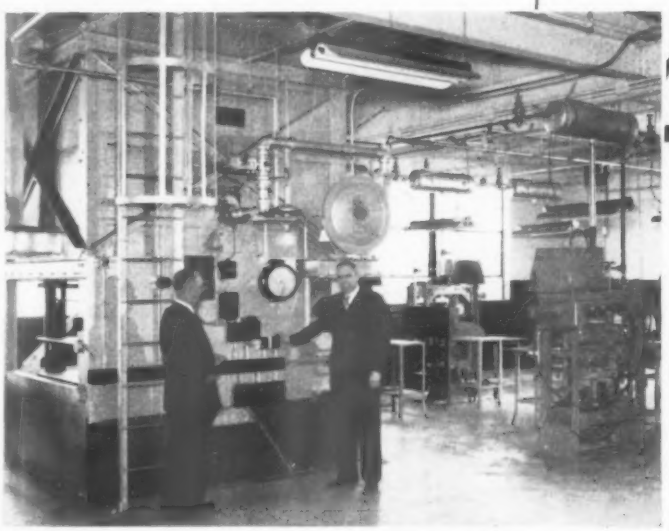
Yours very truly,

UNION BRASS & METAL MFG. CO.

CJB:jh

C. J. Becker
Vice Pres. & Treasurer

Encl. 2



CARL-MAYER VERTICAL CORE OVEN
At Union Brass & Metal Mfg. Co., St. Paul, Minn.

Typical Carl-Mayer Customers!
MANY REPEAT INSTALLATIONS

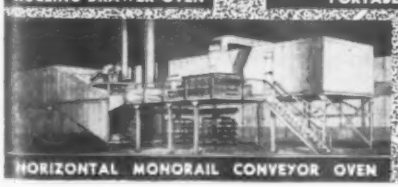
Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Brown Industries
Bucyrus-Erie Co.
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co. Inc.
Henry Kaiser Corp.
Jarecki Mfg. Co.
W. O. Larson Foundry Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Studebaker Corp.
Union Brass & Metal Mfg. Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

ROLLING DRAWER OVEN

PORTABLE RACK OVEN

VERTICAL OVEN

CAR TYPE OVEN



HORIZONTAL MONORAIL CONVEYOR OVEN

The CARL-MAYER Corp.
3030 EUCLID AVE. CLEVELAND, OHIO
CORE AND MOLD OVENS

(*Continued from page* 236)

successfully applied to aluminum castings.

Areas to be welded must be thoroughly cleaned and free from foreign inclusions. To aid welding operations and minimize the possibility of thermal strains or cracks, the casting should be preheated in an oven, or the area to be welded should be preheated with the torch. In general, the welding rod should be of the same alloy as the casting, especially where heat treatment is involved. If a flux is required, it must be thoroughly cleaned off after the weld is completed, as welding fluxes are corrosive to aluminum. All welds should have excessive material removed and be dressed to specified casting dimensions.

Castings requiring heat treatment should be welded before treatment or retreated after welding. Small welds in areas where service stresses are low, however, usually can be made in castings that already have been heat treated without seriously impairing strength, especially if the arc method is used.

TRANSITE CORE PLATES are lighter, stronger, resist warpage.

• Core makers can handle more Transite* Core Plates at one time, thus make fewer trips. That means faster production with less fatigue and fewer accidents. Transite Core Plates offer all these advantages:

They Last Longer—Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

They Clean Easily—Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist Corrosion and Warpage—Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are Economical—Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

For full details, write Johns-Manville, Box 290, New York 16, New York.

JM PRODUCTS

*Reg. U.S. Pat. Off.

Johns-Manville

TRANSITE CORE PLATES MADE OF ASBESTOS

Impregnation: The design of parts that must be pressure tight or leakproof often is such that pressure-tight castings are difficult to produce. In such instances, impregnation offers a means of salvaging castings that do not pass the initial pressure test. Suitable impregnants include sodium silicate, tung oil, styrene, linseed oil, phenolic resin and drying oil resin. Sodium silicate is most commonly used, and the castings may be treated either singly under pressure or in quantities with or without pressure.

In treating one casting at a time, all openings except one are closed. The casting then is filled with the impregnant and a fitting is attached to the remaining opening through which pressure of at least 10 psi may be applied. Both the casting and the impregnant should be heated to 150-200°F before the operation begins. Pressure is maintained and the casting is kept hot until seepage occurs or the leak is stopped.

Process Is Repeated

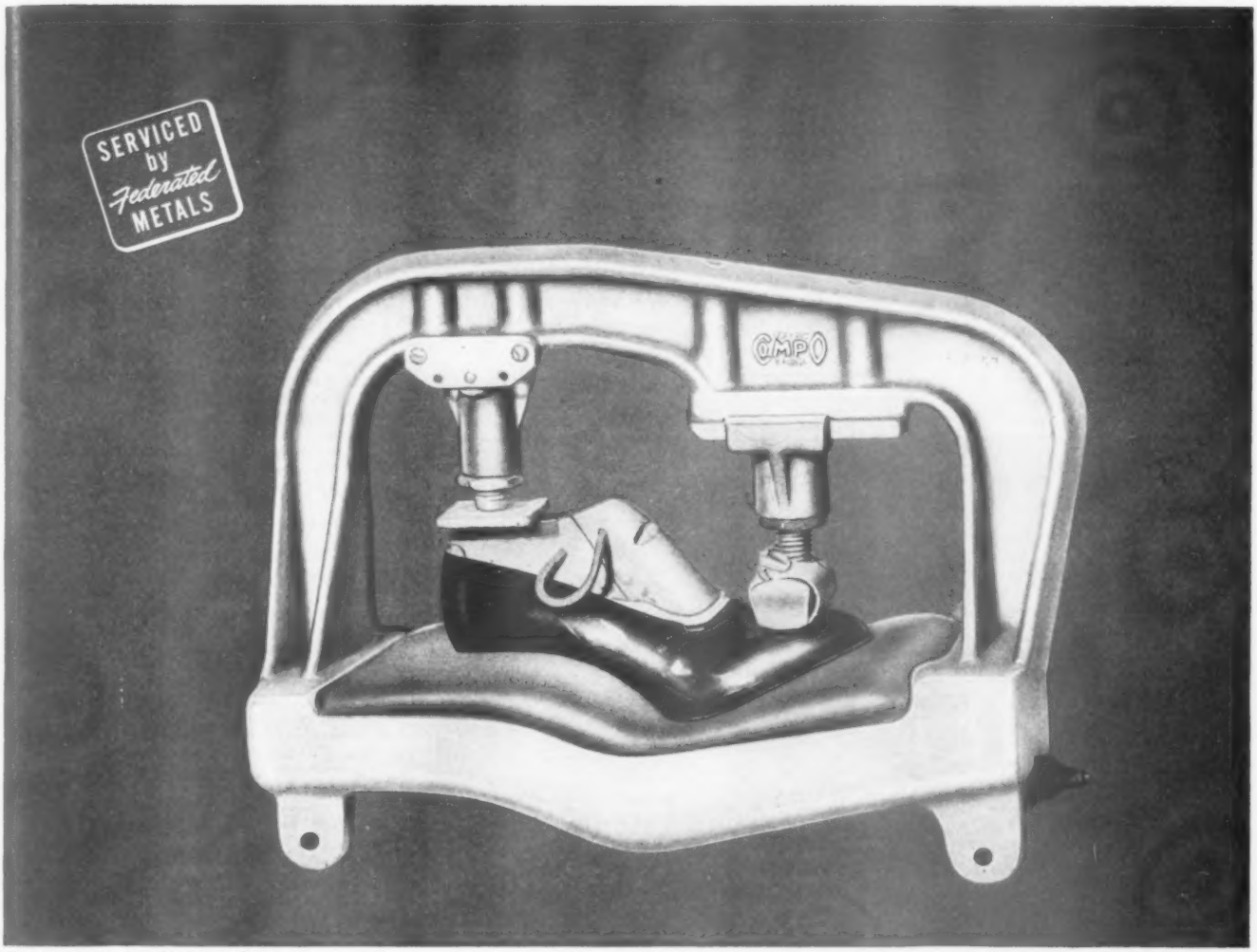
An alternate method sometimes is used, starting with both the casting and the impregnant at room temperature. Pressure is applied until sweating is observed; the porous area then is heated until the water is evaporated. Pressure again is applied and the process is repeated until the leak is stopped. Temperatures should not exceed 250°F except with castings that are to be subsequently aged, in which case the baking of the impregnant and the aging can often be carried out as one operation.

When quantities of castings are to be treated at the same time, they may be immersed in a suitable tank containing the impregnant which is maintained at a temperature of at least 150°F. If capillary action does not draw sufficient impregnant into the pores of the castings at atmospheric pressure, additional pressure at 50 to 100 psi may be applied to the tank. Immersion from two to six hours usually is sufficient.

For both processes a water solution is used varying from about one part sodium silicate and five parts of water to about four parts sodium silicate and one part water, depending on the requirements of the particular problem. After impregnation is complete, the solution should be well drained and the castings thoroughly washed in hot water, followed by heating to 212-220°F for one to two hours.

Peening: Minor surface irregularities, such as small sand or gas holes, and small leaks, sometimes may be corrected by peening with an air

(*Concluded on page* 240)



Courtesy, Compo Shoe Machinery Corp.

JMLco-F86

SHOO PROBLEM!

In the manufacture of some boots and shoes an important operation is the bonding of soles to uppers under extreme pressure. A shoe jack, cast of an aluminum alloy, serves as a hood and as a pressure buffer.

Because of the danger involved, the law in many places requires that the jack show deformation well in advance of complete failure. Hence the aluminum alloy must have special properties of ductility as well as strength.

Unsatisfactory jacks in use by a New England manufacturer were submitted to Federated metallurgists for study. They *created* and recommended an entirely new alloy. Shoe jacks now bend visibly before they shatter, eliminating the likelihood of injury to workers.

This is typical of the many problems solved by Federated's technical staff. Have you a non-ferrous foundry problem? Let Federated's practical field metallurgists and competent research scientists help you solve it.

See Federated for the first in service and the first in products—brasses, bronzes, aluminum alloys, babbitts, solders, type metals, bearing metals, die casting alloys and other non-ferrous products.

Federated first in the non-ferrous field AMD

Federated METALS

Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

(*Concluded from page* 238)

mechanical, or hand-operated tool. Peening also is utilized in exploratory testing of the casting for subsurface unsoundness. Where subsurface shrinkage cavities, blow holes, or general porosity exist, the peening tool will break through the surface skin and leave deeper impressions than on sound surfaces. If the peening process reduces the metal thickness below the allowable limit, welding may be required to build up the surface to the required level. In closing leaks, the operation should be performed while the casting is under test pressure. After peening, any of the conventional finishing processes may be applied, except after leak closure, in which case only light grinding, wire brushing, or sandblasting should be used.

Blending: In areas of moderate stress, surface irregularities of larger size than can be satisfactorily corrected by peening may be "blended" into the surrounding area. Imperfections such as gas holes, sand holes, core partings, or surface cracks may be ground out with a rotary file or small grinding wheel. The blended area should form a smooth contour with the surrounding surface. As in peening, if the blending operation results in section thickness below acceptable limits, welding may be required to rebuild the area.

After any of the foregoing salvaging operations has been completed, the casting must be reinspected, using any of the applicable methods discussed in the preceding section of this article.

References

1. "Aluminum Foundries Raise Casting Quality." L. W. Eastwood. THE FOUNDRY, January 1946, page 82.
2. Tentative Specifications for Aluminum-Base Alloy Sand Castings, B26-46T. American Society for Testing Materials, 1946.
3. Tentative Specifications for Aluminum-Base Alloy Permanent Mold Castings, B108-46T. American Society for Testing Materials, 1946.
4. *Process Control of Aluminum Foundry Procedure.* Society of Automotive Engineers, 1946.
5. "Black Light Inspection of Aluminum Castings." E. V. Blackmun and Edwin Bremer. THE FOUNDRY, May 1945, page 96.
6. *Casting Alcoa Alloys.* Aluminum Co. of America, 1947.
7. Standard Methods of Tension Testing of Metallic Materials—E8-46. American Society for Testing Materials, 1946.
8. Standard Methods of Chemical Analysis of Aluminum and Aluminum Base Alloys—E34-45, American Society for Testing Materials, 1945.

Editor's Note: Common defects in aluminum alloy castings and their correction will be discussed in next month's concluding article on the general subject of quality control.

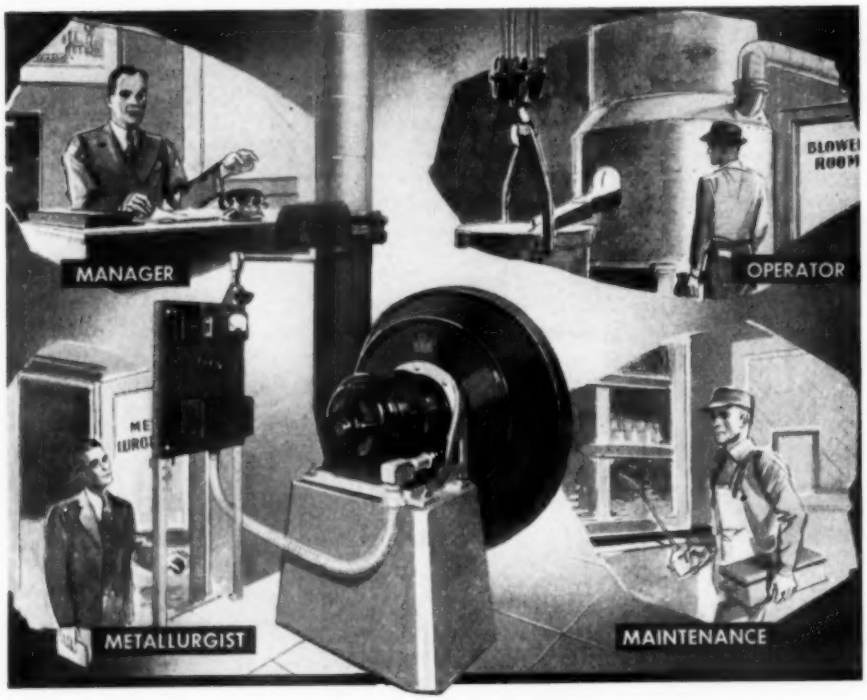
Management Studies Are Published

Policyholders Service Bureau, Metropolitan Life Insurance Co., One Madison Ave., New York 10, has published two reports supplementing a number of studies which are part of a program of service designed to acquaint companies with methods and practices that have resulted in more profitable operation and more stabilized employment in other organizations.

Titles of the new reports are: "Functions of the Controller" and "Business Organization." Copies may be obtained by executives who address the Policyholders Service Bureau under their company's letterhead.

Time Study Clinic

Twelfth annual national time and motion study clinic, sponsored by the research division of Industrial Management Society, will be held Nov. 4-5 at Sheraton Hotel, Chicago. Ralph H. Landes is general chairman of the clinic. Inquiries should be addressed to Industrial Management Society, 176 West Adams St., Chicago 3.



A SUPERIOR FOUNDRY BLOWER

From Any Viewpoint

OPERATOR: "That Ingersoll-Rand Blower and constant air-weight control took the guess-work out of my job. The boss says we now have hotter iron and fewer rejects."

MAINTENANCE: "What can I say? If all our shop equipment gave me no more to do than our cupola blower, I wouldn't have a job at all!"

METALLURGIST: "I went out on a limb for the Ingersoll-Rand principle of automatic air-weight control, and since our tonnage has gone up so much, I've been mighty glad I did."

MANAGER: "I know the boys are all pleased, and I am too. Our records show that we are turning out better castings, and our coke savings alone are going to pay for the blower in less than two years' time!"

Ingersoll-Rand

243-12 11 BROADWAY, NEW YORK 4, N. Y.

Compressors • Turbo-Blowers • Rock Drills • Air Tools • Centrifugal Pumps • Condensers • Oil & Gas Engines

ANNOUNCING

A RESEARCH AND ADVISORY SERVICE ON PROBLEMS RELATING TO

DESIGN OF BLOWER CORE BOXES

***We invite you to send your core blowing problems to us . . . if our years' of experience don't provide the answer, we'd like to study the problem and find the answer!**

FOR INSTANCE

Through research and experience, we have found that core box maintenance has been reduced as much as 300% through the proper design and the application of our *Seal-Tite Ribbing*.

The Abrasive Resistance of Various Metals **has had our careful study so that we can tell exactly what to expect when a core box is put into production. The accompanying table shows the relative resistance to abrasion of fifteen materials which have been tried in core box construction.**

BLAST RESISTANCE TEST RESULTS

Material No.	Efficiency
1	145%
2	135%
3	100%
4	76%
5	70%
6	63%
7	50%
8	50%
9	44%
10	42%
11	41%
12	35%
13	32%
14	20%
15	10%

If you aren't getting the core box life you think you should or if you are planning new core box equipment, we invite you to ask for our Advisory Service. We will welcome the opportunity to give you the benefit of the specialized experience and research which we have devoted to these problems.

New BULLETIN on Core Blowing

We invite you to send for a copy of our new 8-page BULLETIN F

"CORE BOX DESIGNING AND RIGGING FOR CORE BLOWING"

Harry J. Jacobson and Ed. W. Swiess.

INDUSTRIAL PATTERN WORKS

PATTERNS FOR PRODUCTION—PATTERN ENGINEERING SERVICE

2600 BELMONT AVE., PHONE: IRVing—0413 CHICAGO 18, ILL.

COMPARATIVE STRENGTH, HARDNESS OF CORE BINDERS

(*Continued from page* 79)

extended time rather than application of more heat.

It is interesting to note that binder No. 1 had no thinner added, No. 2 a little thinner, and No. 3 about 15 per cent thinner. The peak strength decreased as thinner content increased. It is also interesting to note the effect of rosin and other dryers added to the linseed base. This is demonstrated in Fig. 1 which shows that every commercial oil reached higher strength than pure linseed oil core mixtures within the first hour of baking.

Fig. 2 shows the baking curves of pure linseed oil (binder No. 4) which peaked at 400°F. Fig. 3 shows the baking curves of binder No. 1 which also peaked at 400° F. Fig. 4 shows the baking curves of binder No. 6 which peaked at 500° F. Fig. 3 is typical of the three binders that peaked at 400° F and shows that this type of oil responded to heat faster than did pure linseed, probably due to the petroleum polymers added to the oils. On the other hand pure linseed resisted baking at 450° F and 500° F better than the oils like No. 1. Oil No. 6 which peaked at 500° F showed better resistance to temperatures of 450° F and 500° F than any of the other linseed base oils. None of the oils withstood exposure to 550° F temperature. It was also found that the higher the temperature required for peak strength the sharper the peak and the more rapid the overbaking.

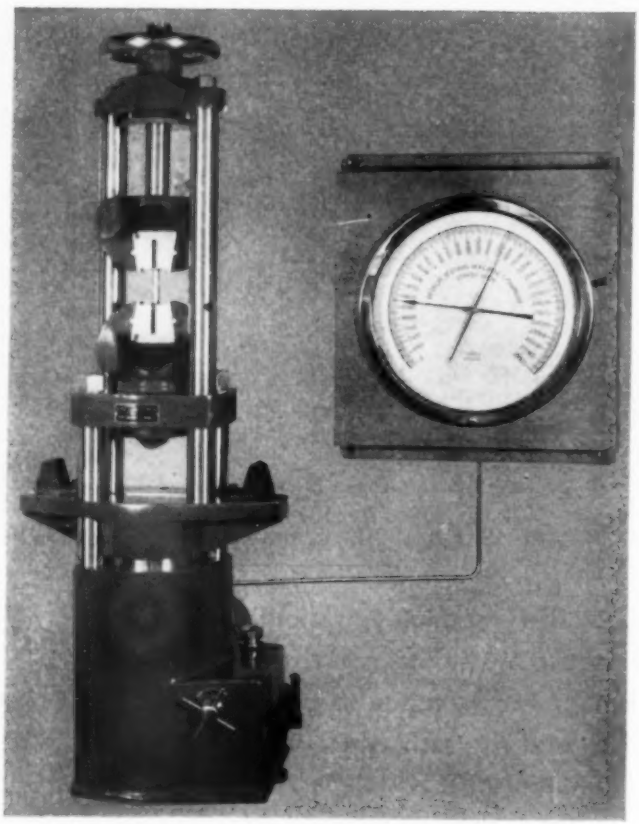
Petroleum Base Oils—Three types of petroleum base oils were tested. Fig. 5 shows the peak strength of each oil and the baking curve of the temperature which resulted in peak load for each. Two oils peaked at 400° F and one at 450°F. All of the oils had either leveled off or started to decrease from their peak, and increased temperature resulted in loss of strength. Figs. 6, 9, and 10 show the baking curves of the three oils. Oil No. 7 (Fig. 6) responded to lower heat much more readily than did the other two and in turn was less resistant to the higher temperatures. In general these oils were less resistant to 500° F baking than were the linseed base oils. None of the oils withstood exposure to 550° F temperature. These oils reached peak strength with shorter time at optimum temperature than did the linseed base oils.

Synthetic Resin Binders — Five binders of this type were tested. Fig. 11 shows the peak strength of each and the baking curve of the temperature which resulted in peak load for each. Two binders peaked at 300° F, two at 325° F and one at 350° F. All of these binders reached peak strength within 2 hours at temperature. It is interesting to note that the lower the peak temperature the higher the peak strength. The binders actually divided themselves into two groups, one set of two having high strength and the other set of three having low strength. Binder No. 10 not only obtained highest strength but also leveled off and retained strength for a longer period of time at temperature. There is an astounding difference in properties for materials which are all in the same base class. Any increase in temperature over the optimum shown in Fig. 11 resulted in rapid loss of strength. Over 350° F led to rapid decrease in strength for even the highest strength binders of the class.

(*Continued on page* 244)

TENSILE TESTING MADE EASY

Quick . . . Accurate . . . Simple



Model UT-3, Capacities 20,000, 30,000 and 40,000 lbs.
(Double on Standard .8 Test Bar)

This comparatively low-cost motor driven, universal tester enables you to make your own tests at a fraction of commercial laboratory costs.

No waiting for reports—Clean up your floor and ship immediately—No special skill and only small bench space required—Plugs into any convenient lighting circuit.

We cordially invite you to visit our booth #1830 during the forthcoming A.S.M. Exposition at the Commercial Museum, Philadelphia, October 25th through October 29th, where the above unit will be on display.

TENSILE—TRANSVERSE—COMPRESSION

Write for Bulletin UT-3

DETROIT TESTING MACHINE CO.
9390 Grinnell Avenue Detroit 13, Mich.

Bailey

PIG CASTING MACHINES

FOR OPEN HEARTH OR ELECTRIC FURNACES—AND FOUNDRIES

Metal cast direct from furnace

Cold pigs as delivered from machine

REDUCES LABOR COSTS .... LONGER LIFE,

because the Bailey Stationary Wheel design has fewer moving parts!

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE BLVD. PITTSBURGH 16, PA.

(*Continued from page 242*)

Figs. 12, 13 and 16 show the baking curves for binders Nos. 10, 12 and 14, which represent highest, medium and lowest peak strength, respectively. Since binder No. 14 was a liquid solution of resin it would be expected to give less strength per unit of binder. Baking at 400° F weakened all of these binders excessively.

Cereal Binders — Three types of cereal binders were used. Originally more cereal binders were included but starches which were 100 per cent gelatinized gave no residual strength and the cores would not hold together for testing. Fig. 14 shows the peak strength of each and the baking curve of the temperature which resulted in peak load for each. Two peaked at 300° F and one at 325° F. It was interesting to note that as dextrinized starch content decreased, peak load decreased. The addition of rosin (binder No. 17) increased the temperature necessary for peak load. Figs. 15, 17 and 18 show the baking curves for the binders. Binder No. 15 which resulted in highest strength overbaked rapidly at 350° F, whereas the other two retained a little strength up to 400° F. A maximum strength was obtained with 1 to 2 hours at temperature. In general these binders baked faster than any of the others tested.

Fig. 7 is a bar chart showing the relative peak strengths obtained in the tests. It is interesting that, as a whole, the linseed base oils gave the highest average strength. However, two of the synthetic resins were equivalent to the best two linseed oil binders. The petroleum base oils were second in average strength, the resins third, and the cereal fourth.

Since cost is also a factor, it is not fair to evaluate the binders on strength alone. Another bar chart, Fig. 8, was drawn to show the pounds of strength obtained for each cent of binder cost. The linseed base binder which gave highest strength also proved to give the most for the money; however, the average showed the best economy to be offered about equally by linseed and petroleum base oils. Cereals ranked second, and resins third in economy. It is necessary to note that the dextrinized cereal binder offered economy almost equivalent to the best linseed base oil.

The widest spread in peak strength values occurred in the resin binders, and the least spread occurred in the petroleum base binders. The difference in range of peak strength is shown in Table II.

Hardness Tests — The cylindrical cores baked with the tensile specimens were tested for interior and exterior hardness. It was noticed during the experiments that maximum strength and maximum surface hardness of cores were seldom attained at the same time. Usually hardness had reached its peak and started downward before strength reached its maximum. This is shown by the following example which represents an oil binder:

Strength, psi	40	130	200
Surface hardness	92	90	87

Linseed binders obtained higher average hardness than did any of the other binders, and cereal binders the lowest. However, the two strong synthetic resins (binders Nos. 10 and 11) gave higher hardness than any of the other binders tested. This is shown in Table III.

The greatest uniformity in surface hardness was shown by petroleum base binders, and the greatest spread by resin binders.

The binders also showed a tendency to fall into two classes insofar as migration was concerned. (Migration

Ajax phosphor copper,

like all Ajax alloys, is produced under rigid laboratory standards to constant formulae. In relation to total cost, Ajax alloys give greater performance. No product can do more . . . so protect your quality work with Ajax alloys.

AJAX METAL CO., PHILADELPHIA 23, PA.

ASSOCIATE COMPANIES: AJAX ELECTRIC • AJAX ELECTROTHERMIC CORP. • AJAX ELECTRIC FURNACE • AJAX ENGINEERING

is the tendency of binder to migrate or move from the center of the core to the outside.) Much of this is due to the solution of binder in the water which forms steam and in escaping from the core carries some of the dissolved binder with it and leaves it at the surface of the core. As demonstrated by Table IV, even the oils had a slight tendency to migrate, but this tendency was much greater with the resin and cereal binders.

While a soft interior and hard exterior is advantageous from the collapsibility standpoint, it may not be so desirable from other standpoints. In the first place, where binders tend to migrate this tendency may become so strong that a thin hard shell will form on the exterior

TABLE IV—Relative Migratory Tendencies of the Binders

Binder Base	Diff. between Center and Outside of Core, %
Linseed	12.7
Petroleum	15.0
Cereal	21.6
Resins	26.0

of the core while the interior has practically no strength. If the hard outer skin is filed, rubbed or punctured, the interior sand may run right out, resulting in core collapse. In the second place, where the center of a core is left soft it is difficult to fasten hooks in big cores which must be moved or set by use of hooks buried in the sand. The best way to overcome this is to add a little oil to any cereal or resin mix to give center strength.

Oil sand cores do not increase in green strength on standing on the rack, but tend rather to lose strength due to evaporation of moisture, and may develop uneven strength at top and bottom of the core through partial seepage of oil to the bottom of the core. Sagging may also occur during baking since the viscosity of the oil decreases very rapidly as temperature rises, and the oil may not set fast enough to form a hard surface layer to prevent sagging.

Distortion of cores may occur during baking if the type of binder is such that it too quickly forms a surface film over the outside of the core which prevents proper drying of the under layers. When sufficient temperature is reached to distill a portion of the binder in the body of the core, bubbling occurs which expands the core.

The ultimate strength of a core is totally dependent on the strength and elasticity of the film formed in baking. This is largely a matter of the proper time and temperature.

The moisture content exerts a profound influence on the baking process. The surface of a core dries rapidly at first, but the interior retains a temperature of about 210° F (boiling point of water) until all drying is completed. At this stage the atmosphere of the oven is high in moisture and this moisture partially retards the surface drying rate, tending to keep a balance in drying between the center and the outside of the core.

To check whether this condition actually occurred, the author made sets of oil-bonded specimens 2 in. in diameter and 2 in. long. A small thermocouple was rammed in the center of each core with lead wires long enough to reach outside the oven. The cores were then placed in an oven held at temperatures of 400 to 600° F. The results are shown graphically in Fig. 19. In each case, regardless of oven temperature, the center of the cores climbed steadily until 210° F was reached and then leveled off at that time until all moisture had been eliminated. There-

AJAX-WYATT
ELECTRIC
FURNACE

This line frequency induction furnace, so universally used in the wrought brass industry, is now, because of improved linings, available for melting all copper base alloys used in the foundry industry.

AJAX ELECTRIC FURNACE CORPORATION
1108 FRANKFORD AVE., PHILADELPHIA 25, PENNA.

Associate Companies:
AJAX Metal Company
AJAX Electrothermic Corp.
AJAX Electric Co., Inc.
AJAX Engineering Corp.

after its temperature rose rapidly until it approached oven temperature.

Increased oven temperature tended to shorten the time the core center held at 210° F, but never eliminated the leveling. As oven temperature rose, however, the cores had increasing tendency to be burnt on the outside if left in until center temperature rose above 210° F, or to be well baked on outside but green at the center. This means that correct baking temperature must be determined which will give an evenly baked core, and attempt at speed-up by increasing oven temperature must be avoided since it results only in improperly baked cores.

When drying is complete and the temperature of the core rises gradually, distillation of any volatile ingredients of the core begins. During this period very little oxidation of the binder can occur because of the practically complete consumption of the available oxygen in the core oven by these volatile and highly reducing products. When this smoky stage of core baking is past, the temperature of the core rises to the oven temperature and true baking takes place.

Humidity has a great effect upon core baking. If humidity is high core baking is retarded by the moisture in the air. Much of the heat energy in the oven is utilized in heating the moisture in the air. Good circulation in a core oven is necessary not only for uniform heat, but also to remove the moisture and volatile materials resulting from core baking, if the most rapid and uniform results are desired.

Summary — There was little difference in the baking temperatures required to obtain maximum strength with linseed or petroleum base oils. Six of the nine oils tested gave highest strength with 400° F baking temperature.

Of the resins and cereal binders four gave highest strength with 300° F baking temperature, three with 325° F, and one with 350° F.

Linseed base oils had higher average strengths than any of the other binders, but when cost per unit was considered there was little to choose between linseed and petroleum base oils.

Two resin binders gave strength as high as the two highest oil binders.

One linseed oil, one petroleum oil, two resins and one cereal binder stood noticeably higher in both strength and economy than others in their same classification.

If strength alone is a factor either a linseed base oil or two types of resin binders should be considered. However, it should be kept in mind that resins migrate and tend to give cores with low center hardness.

If economy is the prime factor, any of the oils or dextrinized starch may be considered.

None of the binders would retain strength when exposed to baking temperature of 550° F.

Least variations in peak strength occurred with petroleum base oils, and most variation with urea resins.

Cereal binders baked fastest and offered greater economy of oven time. Linseed binders were the slowest baking and required an average of an hour longer to reach peak strength. Resins and petroleum base oils were about equal and fell between cereals and linseed base oils in time required to develop strength.

Bibliography

1. Brown, Hiram, "Foundry Sands," *Light Metal Age*, February, 1947, Vol. 5, No. 2, pp. 16-21.
2. Brown, Hiram, "Core Binders and Baking," *Light Metal Age*, April, 1947, Vol. 5, No. 4, pp.12-15, 32.

Editor's Note: A concluding article by Mr. Brown, discussing gases given off by core binders, will be presented in an early issue.

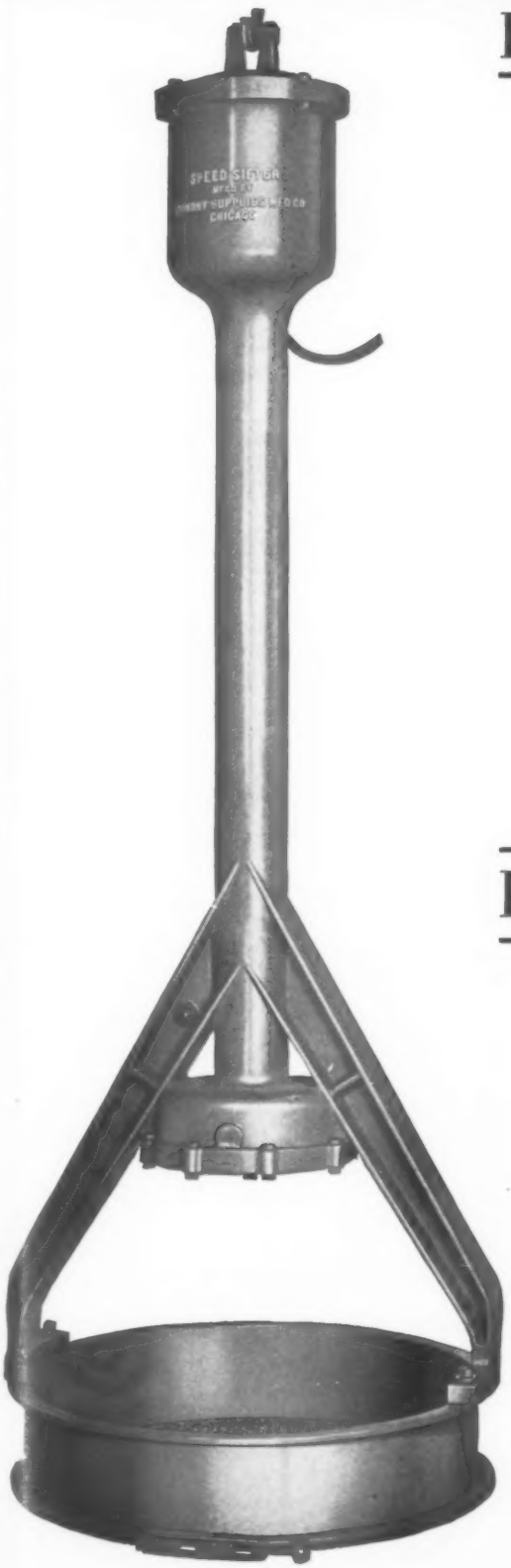
S-G ALUMINUM ALLOY INGOT is produced by craftsmen whose skill and know-how assures you of uniform raw material with which to work. For all types of castings — Die — Permanent Mold or Sand Cast — aluminum alloys trademarked **S-G** are recognized for their uniform quality and the way they meet the most rigid specifications both as to chemical and physical analysis. Our complete modern research and testing laboratory facilities are available to aid you at any time.

SONKEN-GALAMBA Corporation
MEMBER ALUMINUM RESEARCH INSTITUTE
Riverview at 2nd Street · Kansas City 18, Kansas

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

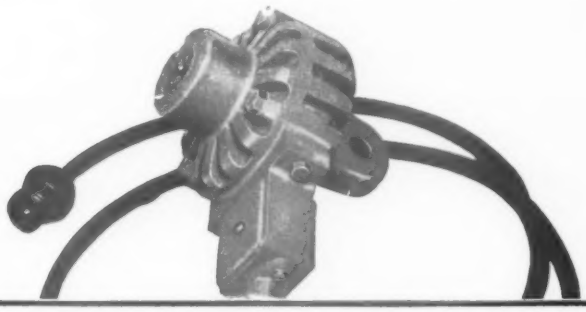
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$210.00 f. o. b. Chicago — complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase.

UNIVERSAL FREE - WHEELING model equipped with motor as above $195.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	**$12.00**
No. 2—Medium match plate work	**15.60**
No. 5—Heavy match plate, tub and bench work	**20.40**
No. 9—Machine and heavier work	**28.80**

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators:
Single pole $3.60, Double pole $4.80.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

INDUSTRY Briefs

CLARK Equipment Co., Tructractor Division, 258 Champion St., Battle Creek, Mich., has added several new units to its chain of independently owned and operated parts and service stations. Stations are located at Baltimore; Brooklyn, N. Y.; Malden (Boston); Chicago; Detroit, Indianapolis; Los Angeles, Memphis, Tenn.; Minneapolis; New York; Norfolk, Va.; Oakland, Calif.; Philadelphia; St. Louis; Seattle and West Allis (Milwaukee).

* * *

Lindberg Steel Treating Co., 222 North Laflin St., Chicago, is building a new custom heat treating plant at 650 East Taylor Ave., St. Louis. The new building will provide 6000 sq ft of floor space and will house 14 new heat treating furnaces, new equipment for induction and flame hardening; equipment for quenching in oil, brine and molten salt, and an atmosphere generator. A metallurgical control laboratory will be located in the office section of the building.

* * *

Marengo Foundry Co., Marengo, Ill., a gray iron shop, has been purchased by Herbert J. Schmitz, president of Central Architectural Iron Works and Farm-Rite Implement Co., both of Chicago. W. T. Milles, previous owner of the foundry, had suspended operations July 16. Operations were resumed early in August under the new ownership.

* * *

Maumee Malleable Castings Co., Woodville St., & W. L. E. Belt Railway, Toledo, O., has purchased the American Boiler & Foundry Co. and American Furnace & Foundry Co., Milan, Mich., for approximately $1 million.

* * *

Caldwell Casting Co., Towson, Md., has been organized to produce nonferrous castings. Vernon Caldwell is president, C. F. Koppisch, vice president, and Albert H. Hintenash, secretary-treasurer.

* * *

Indianapolis Brass & Aluminum Foundry Inc., 50 Shelby St., Indianapolis 2, has changed its name to Sonith Industries Inc. For the last three years the company has been engaged in the production of gray iron, brass and aluminum castings, and recently contracted with Meehanite Metal Corp., New Rochelle, N. Y. to produce Meehanite castings.

* * *

National Sewing Machine Co., State & Meadow Sts., Belvidere, Ill., has been sold to Harmor Development Co., Rockford, Ill., for a reported price of $5 million. Jay Kasler and Morley M. Kasler, Free Sewing Machine Co., Rockford, are principal executives of the recently organized Harmor Co.

* * *

American Steel Foundries, Chicago, has closed its Indiana Harbor, Ind., plant for an indefinite period because operations are unprofitable. The suspension was effective Aug. 16, the date on which the plant had been scheduled to reopen following a two-week vacation.

* * *

Linde Air Products Co., Unit of Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, plans construction of an oxygen distributing and acetylene producing plant at Seventh Ave. North and 22nd St., North, Fargo, N. Dak.

* * *

Wheelco Instruments Co., 847 West Harrison St., Chicago 7, has opened a new office at 136 East Becher St., Milwaukee 7. M. A. Emberton, formerly sales engineer at the Chicago sales office, is in charge of the new Wisconsin office.

* * *

Dee Brass Foundry Inc., 2408 Everett St., Houston 9, Tex., has obtained a 50-year charter of incorporation. Authorized capital is listed as $100,000. Incorporators are Jake Dee, Ed Wey and Nathan Guarino.

* * *

American Beaver Foundry Inc., Caledonia, Wis., has been incorporated to manufacture and sell castings, particularly aluminum. Incorporators are James Culotta, Kenneth Simonsen and Bernard C. Barnes.

* * *

Name of Lancaster Iron Works Inc., 560 South Prince St., Lancaster, Pa., has been changed to Posey Iron Works Inc., in honor of the president and founder, W. W. Posey.

* * *

Interstate Sales Inc., 817 Arcade Bldg., Eighth & Olive Sts., St. Louis 1, has been appointed representative for Vesuvius Crucible Co., Swissvale, Pittsburgh 18. Frank G. Weyforth, formerly with Laclede-Christy Clay

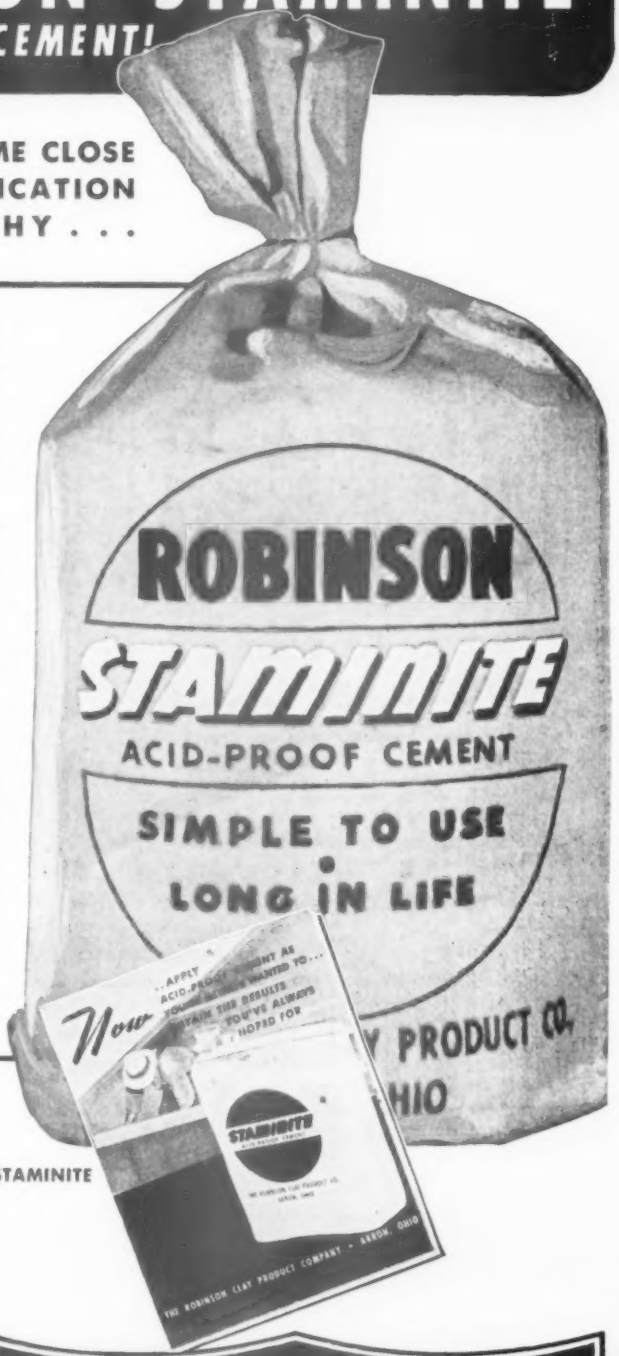
(*Continued on page* 250)

EXPANSION PROGRAM: Erection of a new foundry addition and equipping at a cost of $150,000 has been completed by Peerless Foundry Co., 1853 Ludlow Ave., Indianapolis. The foundry addition joins the old foundry building shown at left in the view above. In addition to the new unit, all parts of the old plant which were damaged or destroyed by fire in 1945 have been restored and re-equipped. Completion of the expansion program increases the total floor space for production purposes by 22,000 sq ft. Company produces castings for furnaces, stoves and ranges.

Compare ROBINSON STAMINITE
WITH ANY OTHER ACID-PROOF CEMENT!

NO OTHER ACID-PROOF CEMENT CAN COME CLOSE TO STAMINITE EITHER IN EASE OF APPLICATION OR IN PERFORMANCE. HERE IS WHY . . .

1. **EASY TO MIX** — Robinson Staminite Acid-Proof Cement is factory mixed. Simply add water according to directions and use as any cement mortar. No job failure can result from improper mixing. No bulky drums of solvent to handle.
2. **EASY TO APPLY** — Anyone who has used a trowel can apply Staminite. No difficult masonry technique is needed to get a good job with Staminite. Installation is quick and inexpensive.
3. **WATER-PROOF** — Staminite is water-proof to the point of actually becoming harder under water. This outstanding feature allows pickling tanks or other installations to be flushed with water without damage to the cement.
4. **ACID-PROOF** — Resistant to oils, solvents, neutral salts. Proof against all acids, hot or cold, except hydrofluoric.
5. **BEST FOR SULPHURIC ACID CONDITIONS** — Low fluorine content of Staminite (only 2% compared with the usual 8%) makes it far superior where sulphuric acid conditions are encountered.
6. **ABRASIVE RESISTANT** — Staminite Acid-Proof Cement is harder . . . more resistant to abrasive action. This feature permits the use of Staminite in many installations not possible with ordinary acid-proof cements.
7. **SETS CHEMICALLY** — Staminite does not depend on acid washes to become acid-proof, or on contact with air to become hard. It sets *chemically* without interfering with brick-laying.
8. **STRONGER . . . LONGER LASTING** — At the end of seven days, Staminite is acid-proof and water-proof, and equal or superior in durability to the best cement mortars.



WRITE FOR FREE FOLDER GIVING COMPLETE TECHNICAL DATA ON STAMINITE

TRY IT IN . . .

STEEL PICKLING TANKS — Staminite masonry surfaces are long-lasting under severest acid conditions . . . can be flushed with water.

IRON CLEANSING TANKS — Used in foundries to clean castings before they are porcelain enameled. Constant flushing of the tanks only makes Staminite harder.

FLUES AND STACKS that carry acid gases from blast furnaces or other installations where corrosive fumes are formed.

BOILER CHIMNEYS — Staminite resists sulphuric acid. It is an especially valuable bonding mortar in chimneys carrying gases from coal of high sulphur content.

THE ROBINSON CLAY PRODUCT CO.
AKRON • OHIO

REFRACTORY PRODUCTS: Standard and Special Shapes in Silica and Fireclay Brick. Ground Fire Clays, High Temperature Bonding Mortars, Plastic and Castable Refractories, Insulating Fire Brick
BUILDING PRODUCTS: Clay Pipe and Fittings, Septic Tanks, Clay Liner Plates, Flue Lining, Clay Stove Pipe, Chimney Tops, Wall Coping, Meter Boxes. R-347-23

SMOOTH SKIN

ON DRY AND GREEN SAND CASTINGS MAY BE OBTAINED THROUGH THE USE OF

CORE WASHES
INGOT MOLD WASH
KLEAN-A-KAST
A special purpose shake on facing
PIPE REDUCER
CARBON RAISING GRAPHITE

ASBURY FOUNDRY FACINGS

Expanded facilities, careful laboratory control, plus 53 years experience . . . adds up to improved products.

THE *Asbury* GRAPHITE MILLS

ASBURY, N. J.

STANDARD HORSE NAIL CORPORATION
NEW BRIGHTON, PENNA., U.S.A.

CHILL KOOLHEAD NAILS

COLD FINISHED HOT FORGED

CLEAN BRIGHT FINISH

MADE FOR CHILLING

WILL PRODUCE THE RESULTS YOU DEMAND

Steel • Stainless • Aluminum • Brass

A TYPE FOR EVERY PURPOSE

CATALOG ON REQUEST

STANDARD HORSE NAIL CORPORATION

SINCE 1872

NEW BRIGHTON, PENNSYLVANIA

(Continued from page 248)

Products Co., and James F. Gilbert formerly of Gilbert Brass Foundry Co., St. Louis, are the organizers of the new sales corporation.

* * *

Pittsburgh Metallurgical Co., 3801 Highland Ave., Niagara Falls, N. Y., plans construction of a $1 million ferroalloys plant on the Tennessee river near Calvert City, Ky. The new plant will utilize the normal electric furnace process for the production of such alloys as ferrosilicon, high silicon pig iron, high carbon ferrochrome, ferromanganese, and low carbon ferrochrome silicon.

* * *

Buflovak Equipment Division, Blaw-Knox Co., Buffalo, manufacturers of chemical and food processing equipment and large gray iron castings, has opened an office at 441 First National Bank Bldg., Houston, Tex. Hugh P. Coulter will be in charge of the office.

* * *

Ajax Flexible Coupling Co., Westfield, N. Y., has appointed A. W. Nash Co., 5225 Wilshire Blvd., Los Angeles 36, as southern California representative. The Nash company is taking over the account from Howard Speddy who is retiring from business.

* * *

Electro Refractories & Alloys Corp., 344 Delaware Ave., Buffalo 2, has acquired a plant at Cap-de-la-Madeleine, Quebec, for the manufacture of silicon carbide. New plant will be known as Electro Refractories & Alloys Canada Ltd.

* * *

Meehanite Metal Corp., Pershing Square Building, New Rochelle, N. Y., has contracted with Goulds Mechanization Ltd., Newport, Monmouth County, Wales, to produce Meehanite castings.

* * *

Fellows & Foster Foundry, Valley Mills, Ind., has suspended operations temporarily and will be moved as soon as a suitable location is found, according to John Fellows, manager.

* * *

Foundry and patternshop of Servel Inc., 119 North Morton Ave., Evansville 20, Ind., has been closed indefinitely. The corporation plans to buy all castings from outside sources.

* * *

McShane Bell Foundry Co., Harford Ave. & B. & O. Railroad, Baltimore, burned to the ground Aug. 16.

* * *

Electro Metallurgical Co., Unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, plans construction of a ferro-alloy plant

(Concluded on page 252)

How to Eliminate Slag Hole Failures in continuous-pour cupola

A good way to avoid slag hole troubles in continuous-pour cupolas is to install CARBOFRAX silicon carbide blocks.

As these blocks retain their uniform hole size, the slag stream is almost constant. Making this possible is the excellent slag erosion resistance of the hard, dense CARBOFRAX blocks. There is practically no hole enlargement even when the blast is on. Adding to the durability of CARBOFRAX blocks is their minimum tendency to spall and crack. Freedom from rapid disintegration is assured.

Check the possibilities of CARBOFRAX slag hole blocks for your continuous-pour cupolas. Their use may save you costly shutdowns. For more data write today to Dept. B-108, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

CARBOFRAX Slag Hole Blocks

BY **CARBORUNDUM**
TRADE MARK

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

Dependable!

. . . is the way most users describe CLEVELAND VIBRATORS . . . they start instantly with full power. The square chromed steel body of this match plate vibrator is borized to a micro finish and expertly fitted with a heat treated, ground and hard chrome plated piston to insure long life and smooth operation. Heads are completely hardened to withstand the rapid, powerful blows developed by the oscillation of the piston. The spring is of long lasting chrome vanadium steel. Quality vibrators are a vital factor in fast, economical production . . . twenty five years as specialists in the field have made CLEVELAND'S best . . . Try 'em!

THE CLEVELAND VIBRATOR COMPANY

2828 CLINTON AVE.

CLEVELAND 13, OHIO

(*Concluded from page 250*)

near Marietta, O. Silicon, manganese and chromium alloys will be produced in the plant.

GATING SYSTEMS FOR METAL CASTINGS

(*Concluded from page 73*)

it ran back into the gating system instead of out into the mold.

The next system, Fig. 17C, had three horizontal steps only 6 in. apart. The metal entered mainly through the lower step but a small quantity did dribble through the upper ones before the level of the metal actually reached them. When the level of metal in the mold finally reached the upper steps, metal ran back into them as in the previous system. With the lowest step, as in Fig. 17D, inclined upwards 60 degrees from the horizontal, the metal first entered the mold through this step, and as pouring continued the second step fed when the metal level reached it. This was the only step gating system that showed an upper step feeding in the desired sequence.

Bottom Side Gate—In the bottom side gating system, shown in Fig. 16, a closed mold cavity was placed before the mold to decrease the velocity of the metal. Metal entered the mold more evenly through this system than through any other studied. Light flashes on the surfaces of the metal were similar to those that were observed in the riser gate system.

Conclusions — These experiments showed that many gating systems did not function as commonly supposed.

Whirl, riser and horn gates were ineffective in preventing turbulence in the mold. In multiple finger gating systems, often most of the feeding was accomplished by the fingers farthest from the sprue. When all the fingers did feed uniformly, a rolling type of turbulence appeared in the mold. With step gates only one design showed feeding in the desired sequence. No gating system prevented turbulence.

Bibliography

1. Fry, S. L., "Preliminary Investigations of Metal Pouring by Cine Radiography", *Foundry Trade Journal*, July 12, 1945, p. 213.
2. Fisher, R. B., Ingersoll-Rand Co., Phillipsburg, N. J., Correspondence.
3. Northcott, L., "The Influence of Turbulence on the Structure and Properties of Steel Ingots", *Journal*, Iron and Steel Institute, 1941, p. 49.

Note: This article published with permission of the U. S. Navy Department without endorsement of statements or opinions of the writers.

The motion picture on which this report is based was shown at the round-table luncheon sponsored by the Steel Division during the Philadelphia convention of the American Foundrymen's Society.

1858 ★ ★ ★ 1948

90

YEARS

of Competent Lumber Service to Industry

but-

specializing in lumber for the pattern shop and the foundry

★

COMPLETE STOCKS OF

GENUINE NORTHERN WHITE PINE

CALIFORNIA SUGAR PINE

NORWAY PINE

HONDURAS MAHOGANY

Kiln Dried Super Thickness Rough or Dressed

Address all inquiries to Dept. "F"—or Wire or Phone your requirements at our expense.

RIETZ LUMBER CO.

1802-14 N. Central Park Ave.
Chicago 47

The COMFORTABLE Answer to High Impact Hazards—

IMPROVED AO FOUNDRY GOGGLES

In safety goggles, protection *alone* isn't enough! That's why AO makes the NFA Foundry Goggle in two sizes to fit large faces and small . . . builds in a pliable corduroy binding that softly "drapes" the entire edge of a genuine horsehide leather mask that's soft in itself. Combined with a one-piece, easily adjustable headband, the result is a snug, safe, non-slip fit. Fogging is no problem — wire screen ventilators let air *in* — keep sparks and flying objects *out.* For operations such as melting, pouring, chipping, grinding, babbitting, hand tool and machine work. Your choice of 50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses in three shades. Ask your nearest AO Safety Representative.

American Optical COMPANY — *Safety Division*

SOUTHBRIDGE, MASS. • OFFICES IN PRINCIPAL CITIES

NEW Equipment AND Supplies

(1)—Band Saw: Owen Pattern & Foundry Co., 710 West 22 St., Norfolk, Va. — Three-wheel utility band saw is designed to cut wood up to 8 in. thick, nonferrous metals 2½ in. thick and plastics, without blade or speed change when changing from one material to the other. Features of the saw include a blade speed of 3200 fpm with a ½-hp motor, 18¼-in. throat from blade to frame, table tilt of 30 degrees inside and 45 degrees outside, and minimized vibration. The saw frame is made of cast aluminum.

(2)—Mold Anchors: Milwaukee Cnaplet & Mfg. Co., 1025 South 40th St., Milwaukee 4—Mold anchors are designed to eliminate costly shifts between cope and drag, which often occur in using snap-flask and slip-flask molds. Inserted in the sand, along the parting line, they are said to keep the cope and drag perfectly aligned when the flask is removed and through subsequent mold handling operations. Made of cold rolled strip steel in two sizes, ¾ in. and 1¼ in. wide, they are easily salvaged when the mold is destroyed and can be reused indefinitely.

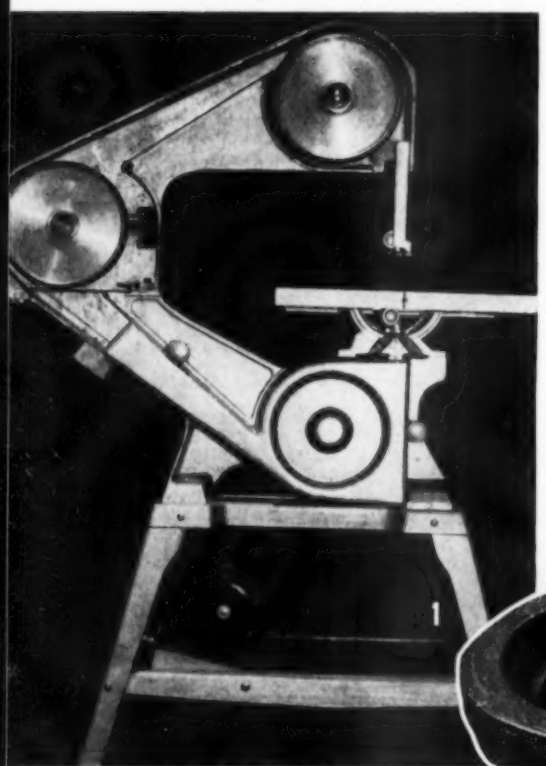
(3)—Brinell Hardness Reader: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Dial of this unit is calibrated to read in Brinell hardness numbers. Two standard dial calibrations are available—one for the 10 mm ball diameter with 3000 kg load and the other for the 10 mm ball diameter with 500 kg load. Readers with special dials for the other ball diameters and loads are made to order. In operation, hardness impressions are made in the usual manner with a brinell tester. The reader is pressed against the piece under test so that the ball point of the reader enters the impression. Hand of the reader will point to correct Brinell hardness number without the use of a conversion table.

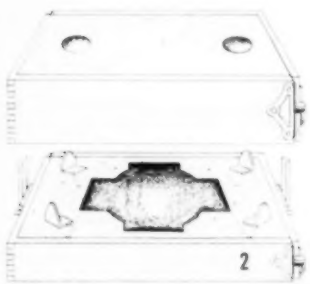
(4)—Rail Sander: Lintern Corp., 64 Lincoln Ave., Berea, O.—Sander is designed to provide maximum traction for track-operated cranes under all conditions both outside and inside, where condensation of moisture on inside rails is common. Flexible rubber distributor nozzle is set close to the rail thereby keeping sand on rail until the wheel passes over it. Flow of sand is stopped automatically when the crane stops.

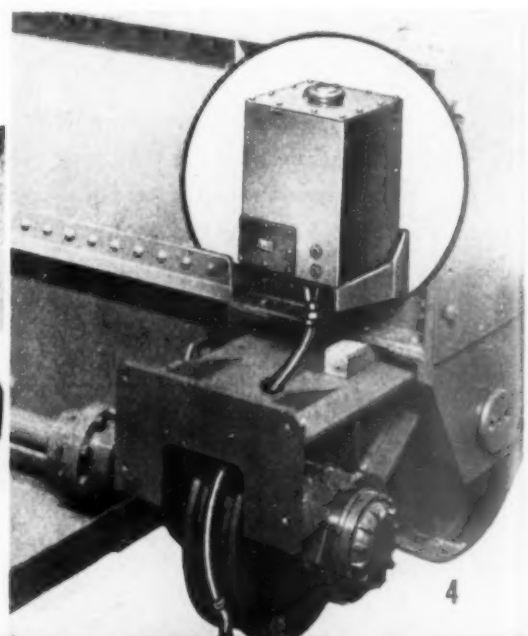
Welding Torch: Hamilton Tool Co., Ninth St. at Hanover, Hamilton, O.—Welding and cutting torch has a flexible head which can be revolved through an arc of 180 degrees. It is designed to cut metal 1/32 to 4-in. thick and cut holes and circles from ⅜ to 30 in. diam with an accuracy to within 1/64 in. Additional features claimed are that it cuts countersunk holes and bevels one or both sides of a straight cut in a single operation, that it executes clean and accurate grooving operations and cuts heads from rivets and bolts without blemish to the surface of the work area.

Power Unit: Kinmont Mfg. Co. Inc., 718 West Wilson Ave., Glendale 3, Calif. — Power unit is designed for turning any round, nearly round or hexagonal object requir-

(*Continued on page* 256)


1


2


4

GET ALL FOUR *with* HYDRO-BLAST

CLEAN CASTINGS CLEAN SAND CLEAN AIR

...*and* A GOOD, CLEAN PROFIT

• clean castings

This is the primary function of Hydro-Blast—to clean castings. It does so, exceedingly well; does it efficiently, quickly; speeding production and cutting cleaning costs, achieving handsome savings that can quickly repay the whole cost of installation.

• clean sand

The washing action of Hydro-Blast *cleans sand*—always improves it, and in a great many instances makes it *good as new.*

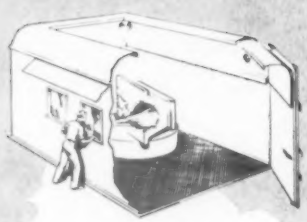
Most Hydro-Blast users report substantial savings in sand cost as an added factor in quickly paying for the Hydro-Blast.

• clean air

Here is a vital by-product of extraordinary value: within half an hour after Hydro-Blast operation is begun, the dust concentration in the air within 50 feet of the Hydro-Blast is lessened by 50 percent.

• and a good, clean profit

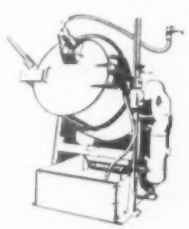
You can get all four. How to get them is worth investigating—still more richly worth enjoying. There's a simple way to start—ask us.



OPERATOR OUTSIDE—for cleaning heavy deeply cored castings by means of high capacity equipment, mechanically mounted.

OPERATOR INSIDE—an efficient low cost method of cleaning deeply cored castings, for production and custom foundries.

HYDRO-BLAST CABINET—excellent for cleaning small, intricately cored castings requiring special attention.



HYDRO-BLAST BARREL—a wet tumbling process, highly effective and economical for cleaning many small castings.

HYDRO-BLAST

Chicago 47, Illinois

2550 NORTH WESTERN AVENUE

▲ PYRAMID ▲
CERAMIC NOZZLES

save money by reducing replacement time due to the fact that they retain their correct orifice longer than cast iron nozzles . . . They do not need steel casings and are remarkably light and easy to handle . . . Due to the above reasons you can save money on every sand blasting operation if you use PYRAMID CERAMIC NOZZLES and in addition they are attractively priced and ready for delivery. A trial order will convince you . . . Write today.

▲ GEORGE PFAFF, INC. ▲
10-61 JACKSON AVE., LONG ISLAND CITY, N. Y.

ALUMINUM

36 YEARS

Over this long period it has been our aim —not to make the most—but to make the

BEST
ALUMINUM INGOTS

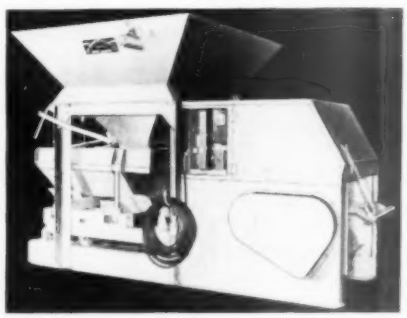
THE CLEVELAND
ELECTRO METALS CO.
CLEVELAND 13, OHIO

MEMBER — ALUMINUM RESEARCH INSTITUTE

(*Continued from page* 254)

ing up to 400 lb circumferential turning force at a surface speed of from 3 to 26 in. per minute. It is adaptable as a positioner for sandblasting, welding, cutting, fitting, grinding, threading, painting and other similar operations. Unit operates on the chain tong principle and weighs 71 lb. Its overall length is 40½ in.; width, 10⅛ in. and height, 15⅜ in. It operates on alternating or direct current and can be plugged into any portable gas driven arc welder. A reversing switch permits rotation of working material in either direction.

Sand Conditioner: Beardsley & Piper, division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Portable sand conditioner has a capacity of 60 tons



per hour and screens, breaks lumps, magnetically separates, aerates and tempers the sand. Heavy, dust-tight enclosures provide maximum protection to the operating mechanism from sand, dust and rough treatment. Operating parts are easily accessible for maintenance. Lubrication is accomplished from convenient centralized locations. Load centered trunnions on the conditioner provide good balance when moving the machine to desired locations and the rigid construction is said to assure normal operation of the machine even though it is placed on irregular or uncleared foundry floors.

Hand Fork Truck: Automatic Transportation Co., 149 West 87th St., Chicago—Motorized hand suspended fork truck has a tilt at carrying position which automatically cradles all loads. Tilt operates through a vertical cam bolted to the lower front of the truck's mast. It can be adjusted to begin from 3 to 12 in. above the floor. Truck is electric powered and operated by push button controls. Direct connected hydraulic-lift motor and pump are controlled by a hydraulic release lever. Road clearance of the truck is 4⅝ in.; capacity is 2500 lb for a 36-

(*Continued on page* 258)

ROSSBOROUGH

Nonferrous Fluxes

SPECIALISTS IN NONFERROUS FLUXES FOR 16 YEARS

BRASS AND BRONZE FLUX— A neutral flux with low melting point which protects your metal during the melting process and keeps furnace and crucibles clean without attacking the linings.

ALUMINUM FLUX— An all purpose aluminum flux designed to deoxidize, de-gas and increase recovery from skimmings at a lower temperature.

ALUMINUM BOILING FLUX— A special aluminum flux for preventing shrinks and misruns in permanent mold and thin section sand castings.

ALUMINUM SMELTING FLUX— A powerful flux for use on all scrap materials. Reacts at a low temperature increasing metal recovery. Recommended for smelting use or for remelting of gates, borings and scrap.

Ask Our Jobbers for Rossborough "Aluminum Ladle and Furnace Coat" and "Permanent Mold Spray."

COMPLETELY STOCKED JOBBERS

Boston, Mass.	Malcolm G. Stevens Co., 78 Summer St., Arlington, Mass.
Brooklyn, N. Y.	New York Sand & Facing Co., 106-114 Grand Ave.
Chattanooga, Tenn.	Manufacturers Equip. & Supply Co., 1200 Fort St.
Chicago, Ill.	Foundry Supplies Co., 461 West 33rd Street
Cleveland, Ohio	Hoffman Foundry Supply, 1193 Main Ave.
Dayton, Ohio	Fenton Foundry Supply Co., 134 Gilbert Street
Detroit, Michigan	Wolverine Foundry Supply Co., 3211 Bellevue Ave.
Indianapolis, Ind.	John M. Glass Co., 18 S. New Jersey St.
Philadelphia, Pa.	George F. Pettinos Co., 1206 Locust St.
St. Louis, Mo.	M. W. Warren Coke Co., 1017 Olive St.
Los Angeles, Calif.	Independent Foundry Supply, 2325 E. 38th Street

ROSSBOROUGH SUPPLY COMPANY

1457 WEST NINTH ST. CLEVELAND, OHIO

SAHARA
Heat Resisting
BELTING
For Handling Hot Materials

Foundries find Sahara Belting unexcelled for conveying and elevating hot materials. This has been definitely proved in actual service by test after test.

For handling materials up to 300° F., **Standard Sahara** is recommended. For sustained temperatures from 300° F. to 450° F., **Insulated Sahara** combines asbestos and special insulating material with the cotton base.

Special Impregnation

The heat resisting efficiency of Sahara Belting is due to special impregnation and insulation, developed by Imperial during the past 30 years. The base of both Sahara and Insulated Sahara is 37½ ounce, tight-woven duck with a tensile strength of over 700 lb. per inch of width. Ply separation is permanently prevented by our double-stitched, Inner-Locked construction.

Write for Data Sheet 47-8, and prices on Sahara Belting.

IMPERIAL BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.

Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

(*Continued from page* 256)

in. load or 2000 lb for a 48-in. load. Lifting height of the forks is 64 in., and overall height is 79 in. Truck is available 32¼ in. wide or 42 in. wide.

Flexible Shaft Machine: Elliott Mfg. Co., 350 State St., Binghamton, N. Y.—Flexible shaft machine features a new type countershaft mounting spaced well above the motor tilt axis to give adequate endwise yielding motion to the flexible shaft as the operator tilts the motor assembly. The countershaft includes a vertical adjustment op-

erative through more than 4 in. to provide positive and accurate belt tensioning with a standard three or four step cone pulley on the motor shaft. By substituting an optional variable pitch pulley for the cone pulley on the motor shaft, the vertical adjustment provides stepless speed variation through a ratio of over 2:1. Hinged guard with shock mounting swings away from the drive pulley at the press of a button, for changing belts or belt positives. A utility box is placed over the motor for small wrenches and accessories, and a circular tool tray is optional equipment.

Air Filter: American Air Filter Co., 215 Central Ave., Louisville 8—New electronic air filter has intermediate cleaning efficiency for applications where the efficiency of a mechanical filter is too low and that of an electronic precipitator is unnecessarily high. It is basically an electronic precipitator without an ionizing unit and contains a collector element of electrostatically charged laminated cellulose paper which also is used as a filtering media in mechanical filters. When an electrostatic charge is applied to the paper, the plies separate and each fibre be-

(*Continued on page* 230)

Introducing... a "NEW LOOK"

CESCO's Spec-lite Goggles
Approved with Enthusiasm!

• The CESCO Spec-lite is new, different and improved—with 6 outstanding features: **1)** Lightweight, sturdy construction—weighs but 1 oz., supported by durable metal frame; **2)** New-type forehead rest plus balanced temple suspension—goggle virtually floats in position; **3)** Quick adjustability for correct fit on various faces; **4)** One-piece plastic lens, quickly replaceable, distortion-free; **5)** Modern, snug-fitting comfortable temples; **6)** Low first cost, low upkeep.

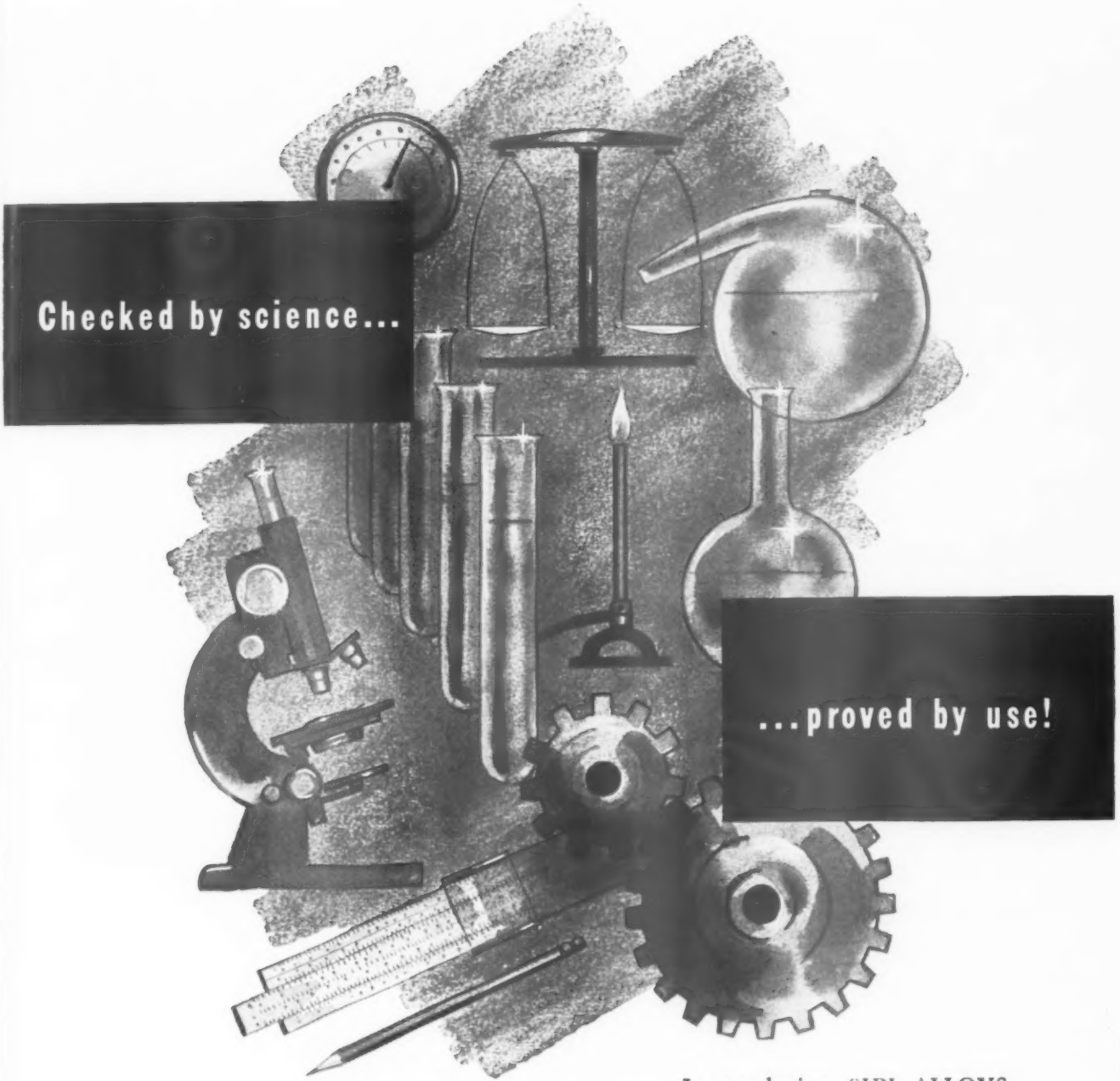
CESCO's Spec-lites
Ideal for many Safety Purposes!

• This CESCO Spec-lite is actually an eye shield—protects entire eye area from sparks, light impacts and other hazards. It can be worn with or without personal glasses. Available with either clear or glare-reducing green plastic lenses.

If you haven't seen the new CESCO Spec-lite Goggle, *be sure to do so.*

CHICAGO EYE SHIELD COMPANY
2336 Warren Boulevard
Chicago 12, Illinois

CESCO
FOR SAFETY



In producing SIPI ALLOYS, every step is controlled by the most exacting methods . . . is checked by the most delicate instruments provided by modern science. The resulting I.Q.* is proved in daily use . . . in your foundry . . . every time!

**Ingot Quality*

SILVERSTEIN AND PINSOF
INCORPORATED
1720 ELSTON AVE. CHICAGO 22, ILL.

Copyright 1948, Silverstein and Pinsof, Inc.

BRASS • BRONZE • ALUMINUM • LEAD • TIN • SOLDER • TYPE METALS • BABBITT • ZINC BASE ALLOYS

A TOUGH RUGGED OASIS for MILLS, FOUNDRIES, Etc.

For trouble-free service where there is excessive heat, dust, lint, acid fumes or high humidity

Here's a highly efficient OASIS Electric Water Cooler that's sealed against dust-laden, lint-filled air . . . heavily insulated against external heat . . . unaffected by high humidity . . . impervious to acid fumes. It features a water-cooled condenser in an airtight cabinet! There's durability in its stainless steel top and heavy-gauge, rustproofed cabinet. Available with EBCO's smooth-working dial-action bubbler or handy glass filler —or both. Write for details on OASIS Model OP-10-W. *The EBCO Manufacturing Co., 401 West Town St., Columbus 8, Ohio.*

OASIS ELECTRIC WATER COOLERS

Made by the World's Largest Maker of ELECTRIC DRINKING WATER COOLERS

(*Continued from page* 258)

comes a collecting electrode which attracts and holds dust and smoke particles. Since the unit will continue to function as an air filter when de-energized, its operation may be varied to suit the dust condition.

Jig Saw Attachment: LaMonte Mfg. Co., 9746 Ramona St., Bellflower, Calif.—For sawing wood, plastic, light metals and leather this jig saw attachment is designed to be mounted on any drill press in a few minutes. All that is necessary is to grip the power unit in the chuck and fasten the work table to the drill press with C clamps. Ordinary jig saw blades are used, and they may be

mounted in all four positions, permitting sawing in any direction. All moving parts in the hermetically sealed power unit are packed in grease to provide lifetime lubrication.

Penetrators: Clark Instrument Inc., 10200 Ford Rd., Dearborn, Mich.—Two improved diamond penetrators for Rockwell testing are made to fit all makes of hardness testers. One model is for standard testing and the other for superficial testing. Diamond points are selected for proper stratification and freedom from internal stresses, and holders are finished to precisely correct angles and radii.

Temperature Measurement: Brown Instrument Co., Division of Minneapolis-Honeywell Regulator Co., 4420 Wayne Ave., Philadelphia 44—Portable electronic temperature indicating and recording instrument is designed to provide rapid indicating and recording, simplicity of installation and operation, and low level maintenance. Two port-

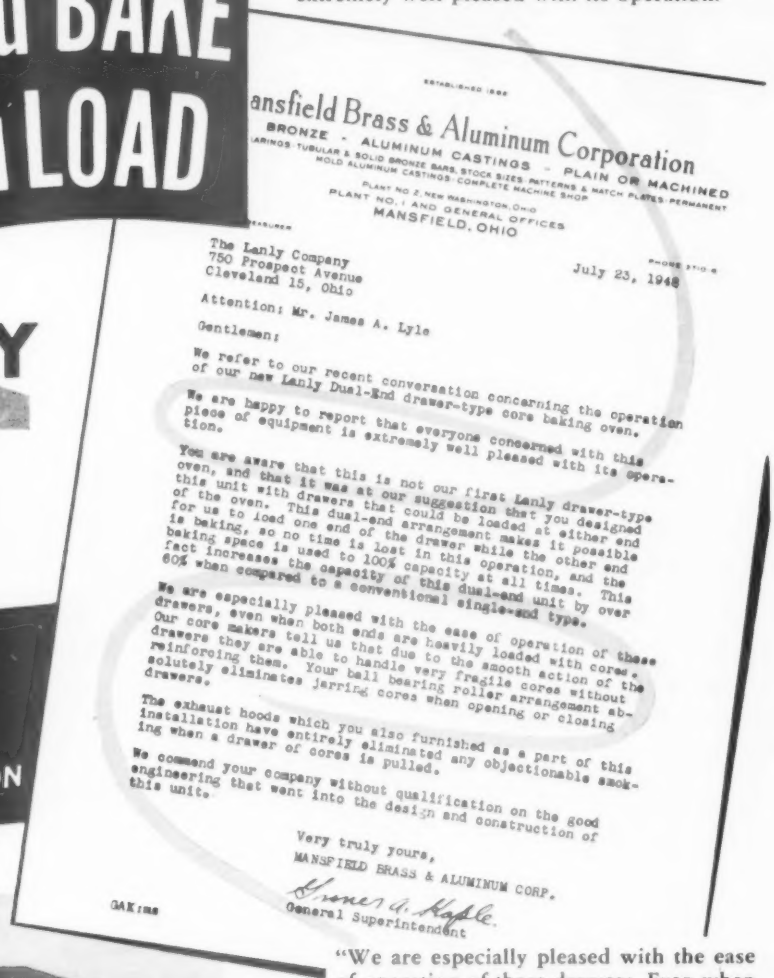
(*Continued on page* 262)

LOAD while you BAKE
-BAKE while you LOAD

with this LANLY DUAL END DRAWER TYPE CORE•OVEN

SAVES TIME
SPEEDS UP CORE PRODUCTION
SMOKELESS EXHAUST SYSTEM
SMOOTHER NO-JAR DRAWER ACTION

"We are happy to report that everyone concerned with this piece of equipment is extremely well pleased with its operation."



Mansfield Brass & Aluminum Corporation
BRONZE - ALUMINUM CASTINGS - PLAIN OR MACHINED
BRASS CASTINGS, TUBULAR & SOLID BRONZE BARS, STOCK SIZES, PATTERNS & MATCH PLATES, PERMANENT MOLD ALUMINUM CASTINGS, COMPLETE MACHINE SHOP
PLANT NO. 2, NEW WASHINGTON, OHIO
PLANT NO. 1 AND GENERAL OFFICES
MANSFIELD, OHIO

The Lanly Company
750 Prospect Avenue
Cleveland 15, Ohio

July 23, 1948

Attention: Mr. James A. Lyle

Gentlemen:

We refer to our recent conversation concerning the operation of our new Lanly Dual-End drawer-type core baking oven.

We are happy to report that everyone concerned with this piece of equipment is extremely well pleased with its operation.

You are aware that this is not our first Lanly drawer-type oven, and that it was at our suggestion that you designed this unit with drawers that could be loaded at either end of the oven. This dual-end arrangement makes it possible for us to load one end of the drawer while the other end is baking, so no time is lost in this operation, and the baking space is used to 100% capacity at all times. This fact increases the capacity of this dual-end unit by over 60% when compared to a conventional single-end type.

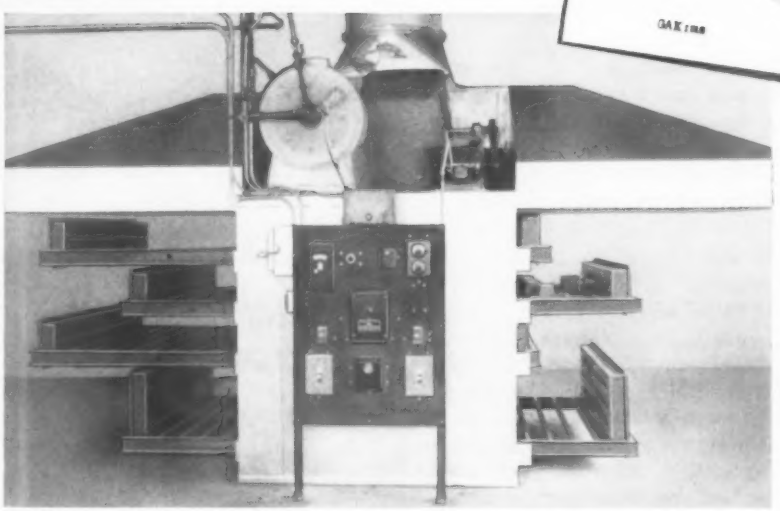
We are especially pleased with the ease of operation of these drawers, even when both ends are heavily loaded with cores. Our core makers tell us that due to the smooth action of the drawers they are able to handle very fragile cores without reinforcing them. Your ball bearing roller arrangement absolutely eliminates jarring cores when opening or closing drawers.

The exhaust hoods which you also furnished as a part of this installation have entirely eliminated any objectionable smoking when a drawer of cores is pulled.

We commend your company without qualification on the good engineering that went into the design and construction of this unit.

Very truly yours,
MANSFIELD BRASS & ALUMINUM CORP.
Grover A. Kapple
General Superintendent

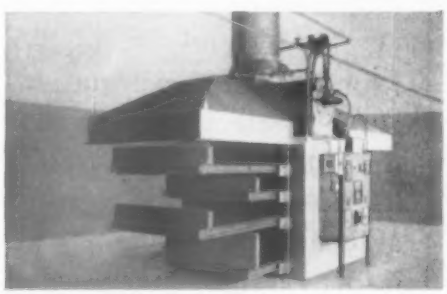
GAK:ms



The above letter from Mansfield Brass & Aluminum Corporation of Mansfield, Ohio, is strong testimony of their satisfaction with LANLY SERVICE. Almost sufficient by itself is the closing paragraph,

> "We commend your company without qualification on the good engineering that went into the design and construction of this unit!"

"We are especially pleased with the ease of operation of these drawers. Even when both ends are heavily loaded we are able to handle very fragile cores without reinforcing them."



"This dual-end arrangement makes it possible for us to load one end of the drawer, while the other end is baking, so no time is lost. Baking space is used to 100% capacity at all times. Capacity is 60% greater than a single-end type."

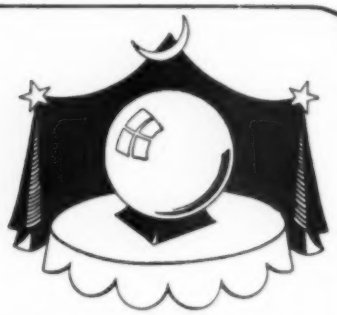
THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
750 PROSPECT AVENUE · CLEVELAND, OHIO

The LANLY Co.
Cleveland, Ohio

- ☐ Send information regarding Dual-End Ovens.
- ☐ Send information regarding ..... Ovens.
- ☐ Have representative call when in this vicinity.

Company .....
Address ..... By .....

Clip to your letterhead and mail.



Predictable Castings

Most of the "guess" has been taken out of foundry work; cast iron has become predictable. Improvements are due to better control at all stages of foundry practice, and to the use of alloy irons.

Predictable Molybdenum high strength cast iron is used for engine cylinders, cylinder blocks, liners, brake drums and other castings where strength and toughness, together with good wear resistance and heat resistance, are paramount.

Molybdenum is a popular alloying element in high duty irons because of its positive and predictable improvements; the improvements far outbalance the additional cost.

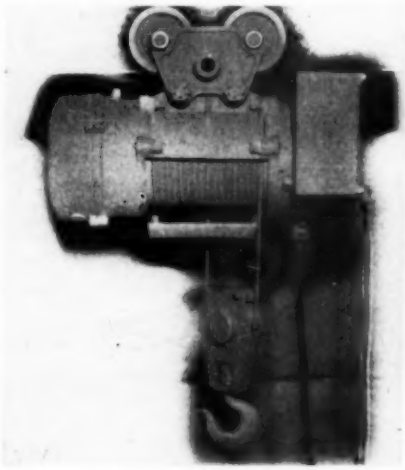
Authoritative engineering data on Molybdenum cast iron and its applications are furnished by Climax Molybdenum Company.

Climax Molybdenum Company
500 Fifth Avenue, New York City
F.I.

(*Continued from page* 260)

able thermocouples can be used in conjunction with the measuring instrument—one for measuring temperatures of molten brass, bronze and copper in the furnace, and the other for measuring temperatures in the crucible.

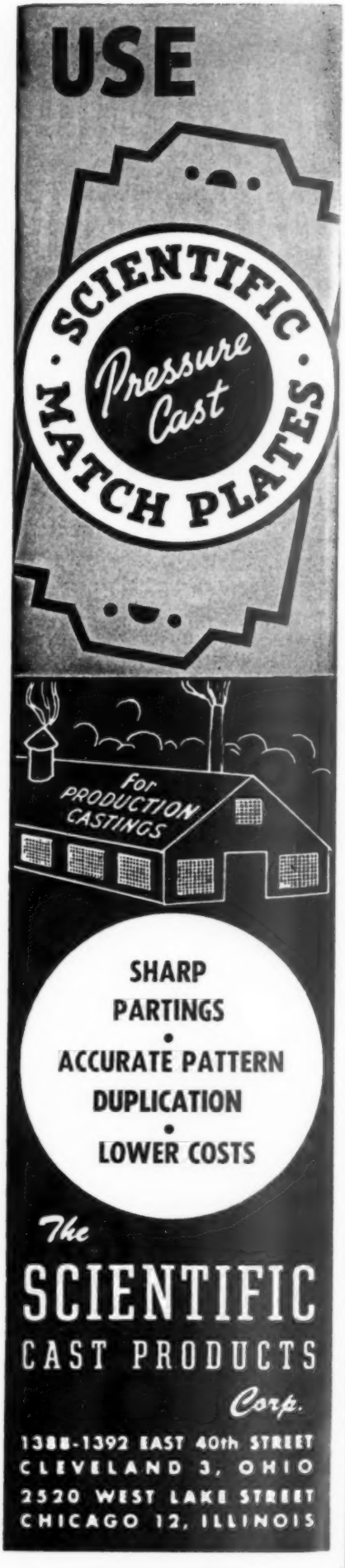
Hoists: Lisbon Hoist & Crane Co., Lisbon, O.—Additional models and new 3 and 5-ton capacity hoists are light in weight, said to have a safety factor of six to one and better and have small overall dimensions obtained by mounting the motor on the inside of the cable drum. Hoist is made in three sections, permitting easy access to any part by the removal of four bolts, and is made of steel castings and forgings with ball bearings throughout. Gears are heat treated alloy steel.



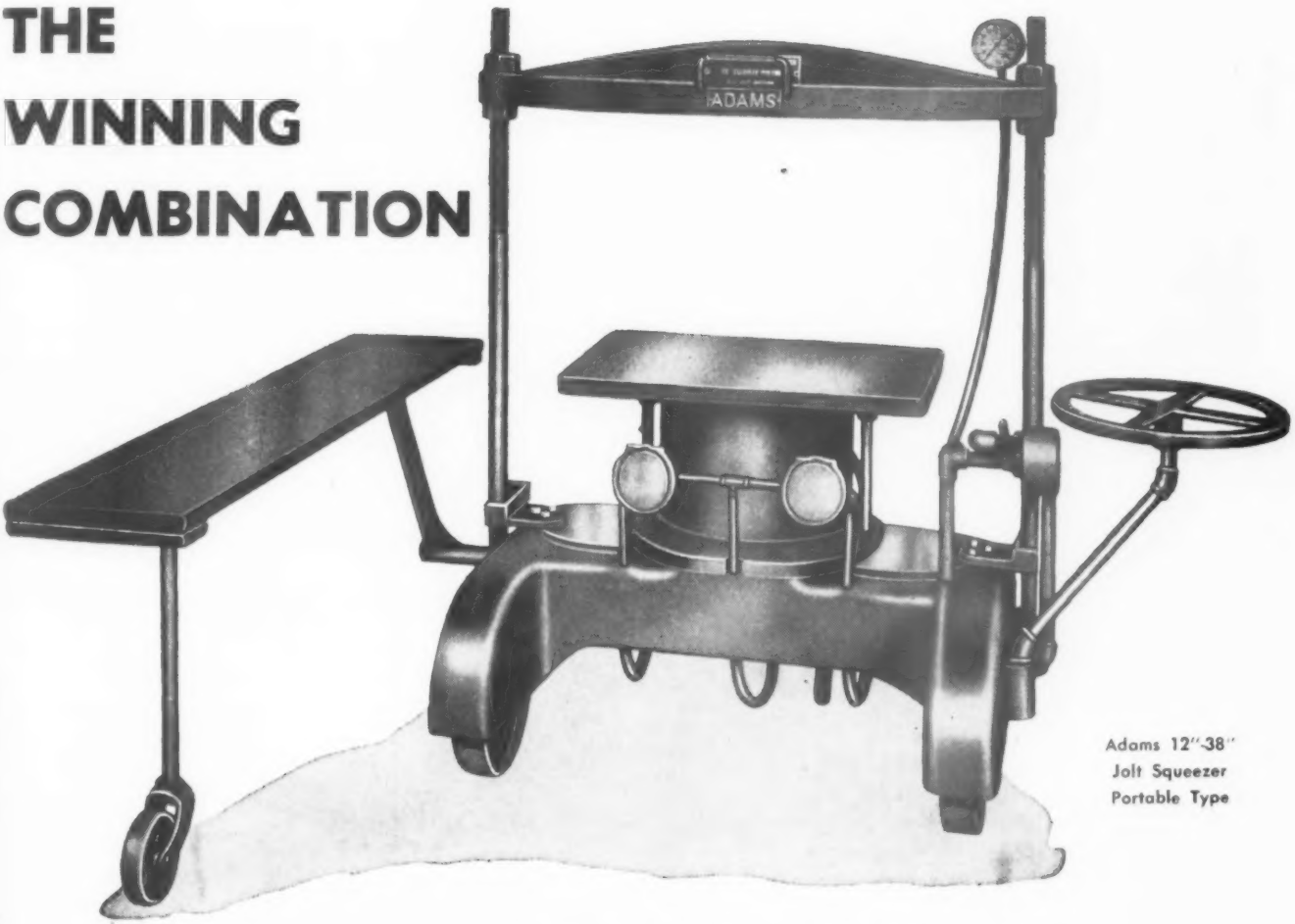
Portable Elevator: Revolvator Co., U. S. Routes 1 & 9 at 86th St., North Bergen, N. J. — Hand-operated portable elevator has overall height of 77 in. and lift height of 62 in. Platform is 24 in. square and the height when lowered is 4½ in. Lengthening of the hoisting cable by running it through a double sheave increases the capacity of the machine from 500 to 1000 lb. Lift is 2-1/8 in. per turn of the crank for the 500-lb load and 1-1/16 in. for the 1000 lb load.

Bushing Gage: Bedford Tool & Forge Co., 22 Interstate St., Bedford, O. — Gage is designed to check bushings in a pneumatic hammer for size and thus help prevent shank breaking due to worn bushings. One end of gage is marked "GO" and is stamped 0.683-in. which allows 0.004-in. of clearance under the proper size of a new bushing or approximately the same size as a standard chisel

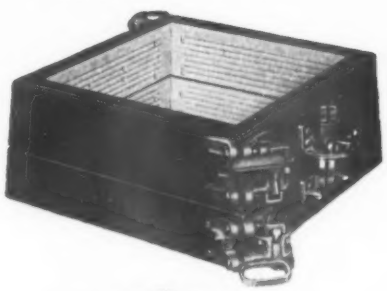
(*Continued on page* 264)

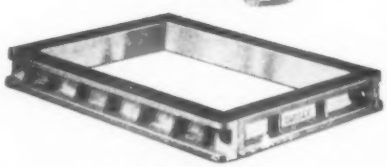


THE WINNING COMBINATION



Adams 12"-38"
Jolt Squeezer
Portable Type





ADAMS UNIVERSAL JOLT SQUEEZERS

EQUALLY efficient as jolt-squeeze-pattern-draw machines or plain jolt squeezers, these simply designed production units will reduce production costs and minimize rejects. Their operation is so simple and easy that no special skill is required to maintain uninterrupted high production levels. Available in both post and side rod types, stationary and portable.

ADAMS CUSTOM-BUILT FLASK EQUIPMENT

When you use Adams Flask Equipment you are assured the superior performance that means peak production. Adams Cherry Slip Flasks or Cherry Snap Flasks used with Adams Cast Iron, Aluminum or Steel Jackets are a combination hard to beat for accuracy, convenience and economy. Remember—all Adams Flask Equipment is made by experienced craftsmen to your exact specifications.

WRITE FOR descriptive literature detailing the production-boosting features of Adams foundry equipment line. THE ADAMS COMPANY, 800 Foster St., Dubuque, Iowa.

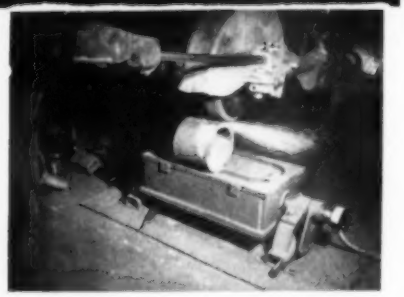
The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

Now—
SWING GRINDING TIME CUT 25%



. . . with DINGS Hold-Tite MAGNET!

Here's a new time and labor-saving device which already has been applied widely in leading foundries for holding castings during swing grinding. Where castings are too heavy for hand grinding but must be locked in position for swing grinding, this magnet is the answer. Set the casting on the magnet, grind it, turn off the power to the magnet and remove the casting.

Holds castings of any shape absolutely secure, eliminates wedging, blocking or clamping, saves time, speeds up the work. Reduces set-up time, decreases grinding time, helps production planning, increases grinding wheel life.

Time studies at a large steel foundry prove 25% labor saving. MADE IN TWO SIZES: magnet face 16" x 29½" or 16" x 16". With or without tilting trunnions. Dependable, nothing to get out of order; low operating cost.

For lower swing grinding costs send today for NEW BULLETIN giving complete data on the Dings HOLD-TITE Magnet.

DINGS MAGNETIC SEPARATOR CO.
4708 W. McGeogh Ave., Milwaukee 14, Wis.

Dings
"HIGH INTENSITY"

(*Continued from page* 262)

shank allowing for fit. The other end of the gage is marked "NO GO" and stamped 0.695 in. If the "NO GO" end of the gage enters more than ¼-in. into the bore of the bushing, it shows that the bushing is worn 0.012-in. or more and will set up vibrations on the shank which cause crystallization of the steel and subsequent shank breakage.

Hand Truck: Lewis Shepard Products Inc., 241 Walnut St., Watertown 72, Mass.—Precision balanced two-wheeled hand truck is designed to handle boxes, cases, barrels or miscellaneous merchandise. Truck is constructed of welded tubular steel and comes in two handle lengths;

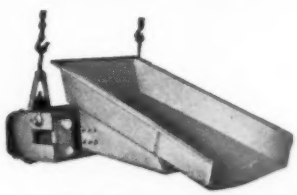
either size can be fitted with straight or curved cross bars. Axle is secured in a tubular housing. Wheels can be furnished in steel, rubber tires or a patented molded plastic. Roller bearings are standard for all three types.

Noise Control: Korfund Co., 48-15 32nd Pl., Long Island City 1, N. Y.—Laminated rubber-cork material for vibration and noise control is composed of a layer of cork bonded between two layers of deep-grooved, oil resistant, synthetic rubber. Ribbed contour of the rubber increases the isolation properties by providing greater deflection and forms a nonskid contact with the floor. Material is available in 1-in. thick sheets up to 24 x 36 in. Recommended loading for the new material is between 7 and 21 psi.

Bench Grinder: Speedway Mfg. Co., 1834 South 52nd Ave., Cicero 50, Ill. — Electric bench grinder has cast aluminum housing with rubber grommets in the base providing shock absorbing feet and holes for permanent vibration-free mounting and is powered by a ¼-hp, 110-120

(*Continued on page* 266)

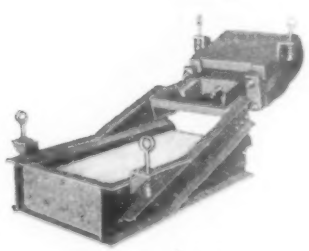
SYNTRON
"Vibra-Flow"
VIBRATORY FEEDERS


Plat Pan

Tubular

Spreader

Grizzly

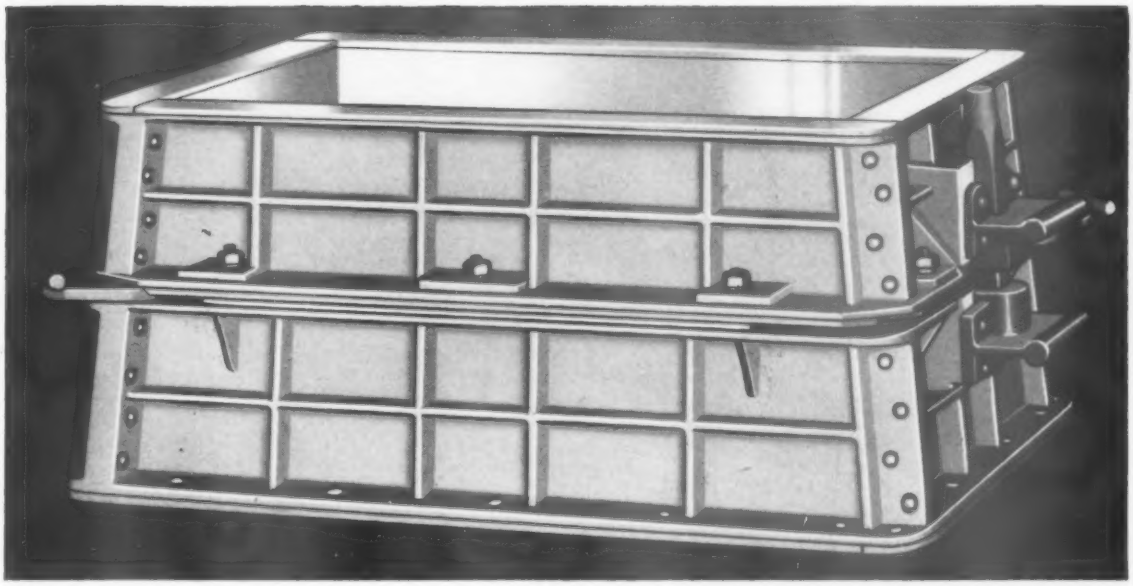

Lawn

Speed Up Material Handling

—by their ability to handle bulk materials, from light, fine powders to heavy, coarse chunks—hot or cold—dry or damp—by providing variable control of rate of flow to meet the capacities of dryers, screens, crushers, belt conveyors, etc.

Write for illustrated folder

SYNTRON CO.
540 Lexington Homer City, Pa.



DIAMOND

. . . . the oldest flask name in the Foundry Industry to-day, now acquires the American Aluminum Flask and Jacket line formerly manufactured by the American Foundry Equipment Co., now known as the American Wheelabrator Company of Mishawaka, Indiana.

These flasks will be produced with the same standards as used by the former manufacturers and a complete line of repair parts are now available to old users.

The Aluminum Flask is an addition to our old established line of DIAMOND Wood Snap and Slip Flasks, Steel Jackets, Bands, Steel Bottom Plates and Core Plates, and will be completely incorporated in the DIAMOND line of molding flask equipment.

DIAMOND

Telephone 2553 **CLAMP AND FLASK COMPANY** Richmond, Indiana

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

IT'S SO EASY

to Mark HOT or COLD CASTINGS with MARKAL PAINTSTIKS

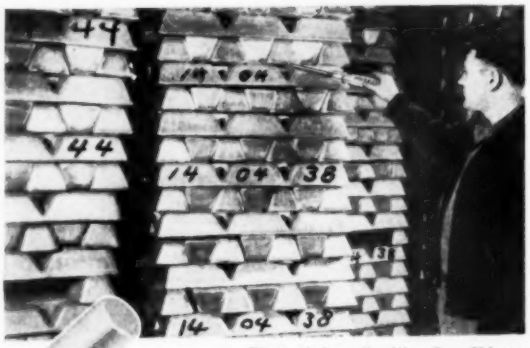


Photo at Apex Smelting Co., Chicago

Tell us your marking problems. We will solve without obligation.

Write for FREE SAMPLES

MARKAL "A" for hot castings, welding and cold parts to be annealed at high temperatures. Range 60°F to 1200°F.

MARKAL "H" For hot castings, plates, slabs, billets and forgings. Range 150°F to 1400°F.

MARKAL "HT" For extremely hot surface markings. Dries instantaneously. Range 250°F to 1800°F.

MARKAL "M" For marking metal surfaces from 0°F to 160°F which are to be annealed at temperatures up to 1800°F.

Marks withstand immediate quenching in water or oil. Marks will not "run", "char", "flow", "discolor", "peel" or "crack".

* * * *

MARKAL "B" For cold rough or smooth, dry, oily or wet surfaces.
MARKAL "C" For cold smooth surfaces requiring instantaneous drying.

All Types FADEPROOF, WEATHERPROOF, PERMANENT.

MARKAL CO. 653 N. Western Ave. CHICAGO 12, ILL.

JOHNSTON

HIGH LIFT—VACUUM TYPE HEATING TORCH

—for skin drying, core patching, ladle drying. Large model shown used for lighting cupolas, drying ladles, etc.

MULTIPLE JET VACUUM ATOMIZER

maintains a steady supply of oil continuously under extreme conditions. Better mixture of air and oil, no pressure on oil. Fast, convenient, safe, economical, dependable and durable. Approved and listed as standard by the Underwriters' Laboratories.

Write for Bulletin F-805

THE JOHNSTON LINE — SAFETY DEPENDABILITY

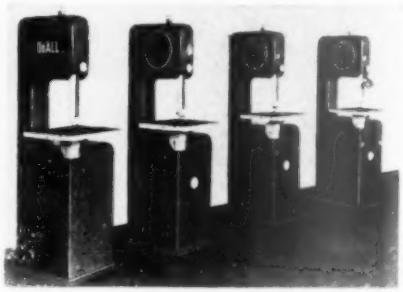
JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

(*Continued from page 264*)

v ac, 50 or 60 cycle motor which operates at 3500 rpm under no load. Two 6 x 3/4 x 1/2-in. grinding wheels, one with 46 grit and the other with 60-80 grit are furnished. Tool rests are adjustable for wheel wear and have built-in side guides with preset angles said to simplify proper grinding of tools.

Bandsaws: D o A L L Co., 254 North Laurel Ave., Des Plaines, Ill.—Basic 16-in. bandsaw may be converted from a single-speed wood-



working saw to a machine with double range variable-speed control, equipped for sawing, filing and polishing operations. Photograph shows the basic saw at left through various stages to the completely equipped saw at right. Arc welded frame is integral with pressed steel shell structure. Motor (1/2 or 3/4-hp) and drive mechanism are isolated by a steel baffle plate. Sawdust chute is built-in and is emptied from the front. Throat depth is 16 in., work thickness capacity is 12-1/8 in., table is 20 x 20 in. with 45 degree tilt right and 5 degree tilt left. Drive wheels are balanced cast aluminum, neoprene-tired and roll on ball bearings. Saw blade tension indicator is calibrated for different saw widths. Job selector dials on variable-speed machine correlate sawing factors to show best sawing operations for each type and thickness of material being sawed. Standard equipment includes such items as rip fences, circle cutting, mitering and contouring attachments.

Carburizing Salt: E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33 — New carburizing salt is said to be readily removed from oil quenched parts by immersion in hot water and is recommended for case hardening of hard-to-clean parts at temperatures up to 1575°F. Advantages claimed for the new product are the production of a true carbon case; maintaining carburizing value when drag out is normal, permitting replenishment with fresh salt; retarding grain growth because of lower temperature

operation, which creates less thermal shock and less tendency to warp; salt washes off readily from threads or crevasses, so that no tumbling or sand blasting is necessary.

Magnetic Brake: Stearns Magnetic Mfg. Co., 662 South 28th St., Milwaukee 4—Magnetic disk brake is suitable for 1/6, 1/4, 1/3, 1/2 and 3/4-hp motors and is designed for continuous or intermittent duty, for alternating or direct current and is adaptable for motor or floor mounting and for horizontal or vertical operation. Brake has straight line solenoid pull for maximum mechanical efficiency, lining wear indicator and easy adjustment to compensate for lining wear. Linings are free from rivets to provide maximum wear, and brake housing is a cover for the mechanism only and can be removed without disturbing the operating parts.

Pallet Truck: Truck-Man Inc., 1436 Ganson St., Jackson, Mich., Dept. G1—Pallet handling truck is powered by a 3-hp gasoline engine and is designed to handle a 3000 lb load. Speeds in either direction are from creeping to 3 mph, and all controls, including the brake, are incorporated in the single transmission lever. Truck has rubber insert load wheels designed to soften the jolts on rough factory floors and contribute to smooth entering of the pallet. Standard forks are 48 in. long. Other sizes are available.

Hole Liner: Interstate Pattern & Machine Co., 4431 Fifth Ave., Rock Island, Ill—Rubber hole liner has been developed to insure a seal between the corebox and blow plate on a core blowing machine. They are said to stop blow plate abrasion without costly machining, make plywood blow plates last like steel, adjust to meet an uneven or wedge shaped core box and permit blowing through narrow ribs and small bosses. All liners are ¾-in. long and screw into holes tapped ⅞-in.—14 N. F. Inside diameters are 5/16, 3/8

RADIANT FACINGS
Since 1879

BILL GAGGER says:

Reduces Chill!
Raises Carbon!

FERROGRAPH

An amorphous graphite readily absorbed by iron.

A graphitizer. Used as a ladle addition, it reduces chill.

A carbon raiser for malleable and steel furnaces.

Made in 3 sizes to fit your jobs.

MEXI-LUMP

Large sized lump, high carbon, amorphous graphite for cupola additions.

Just the type and size for quick carbon pick-up, during the pig iron shortage.

Write us for detailed information for using FERROGRAPH and MEXI-LUMP.

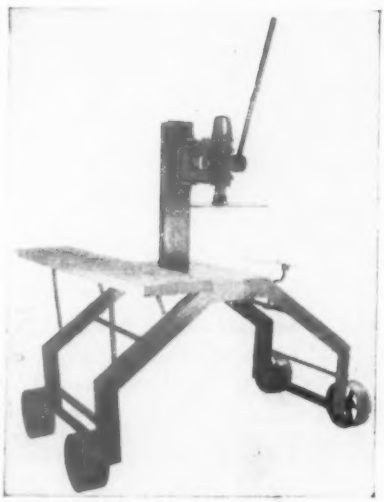
The Smith Facing & Supply Co.
1857 Carter Rd., Cleveland, Ohio

"RAPID" MOLDING MACHINES

★

PORTABLE JOLT SQUEEZER R9X

WRITE for NEW BULLETIN "F"

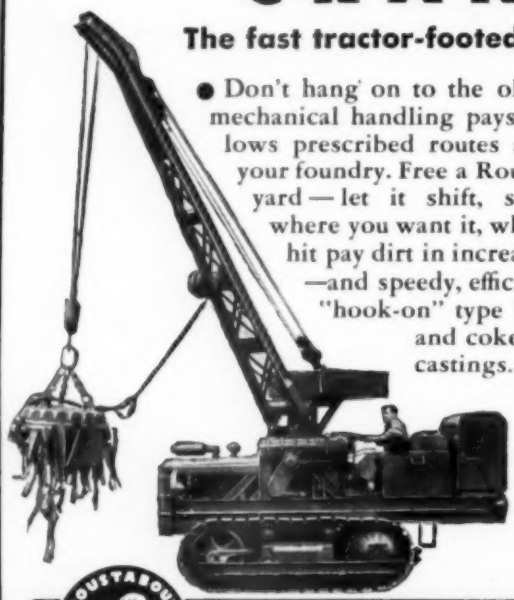


PORTABLE HAND SQUEEZER R-10

PIONEER MANUFACTURING CO.
Molding Machine Manufacturer for Over 20 years
MILWAUKEE (West Allis) WISC.

Mechanical handling in your yard pays too—
with ROUSTABOUT CRANES

The fast tractor-footed load-hustlers



● Don't hang on to the old-fashioned idea that mechanical handling pays off only when it follows prescribed routes and methods—inside your foundry. Free a Roustabout Crane in your yard—let it shift, stack, load, unload—where you want it, when you want it. You'll hit pay dirt in increased man hour savings—and speedy, efficient *action*. Single line "hook-on" type bucket for sand, coal and coke; magnet for scrap or castings. Loads to 7½ tons, wheel or crawler tractors. Make your yard contribute to profits, too—get the Roustabout economy facts now.

Write to Dept. K-5

HUGHES-KEENAN CORPORATION
DELAWARE, OHIO, U. S. A.
Load-Handling Specialists since 1904

NEW HEAVY-DUTY CART

Here's just the cart you need for wheeling *coal, scrap, chips, turnings, borings* and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

Write for Circular No. 50.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 4825-1a

and 7/16-in. Tubes for use in core boxes mounted on blowing machines having the draw feature also are available.

Truck Control: Clark Tructractor Division, Clark Equipment Co., 258 Champion St., Battle Creek Mich. — Foot-operated speed control is now standard on the company's electric battery-powered carloader model fork trucks. Placed for left foot operation, the pedal has four control positions for the different speeds. The driver's right foot operates the brake pedal. Brake operation automatically cuts off power from the battery in second, third and fourth speeds. "Inching" is accomplished in first speed.

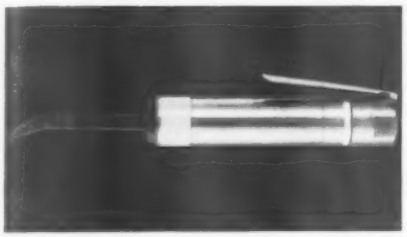
Pot Furnace: Lindberg Engineering Co., 2444 West Hubbard St., Chicago—Gas-fired pot furnace features a one-year guarantee covering

pots used with cyanide or lead (neutral salts excluded) under automatic temperature control. It is claimed that furnaces with from 8000 to 15,000 hours of operation behind them are still using original pots. Furnace is available in four standard sizes using pots 12 x 18 in., 16 x 18 in., 20 x 21 in. and 24 x 21 in.

Magnetic Sweeper: Dings Magnetic Separator Co., 4740 West McGeogh Ave., Milwaukee 14—Permanent plate magnet mounted on wheels for pushing over the floor or ground is constructed to pick up iron or steel particles in machine shops and foundries. It is said to be capable of picking up 10 to 20 lb of turnings or 40 lb of plate in one load and to be equally effective on wet or dry surfaces. The magnet, guaranteed for the life of the sweeper, rests on a horizontal nonmagnetic wearing plate to which the iron and steel is attracted and held. To clean, the operator lifts a lever, raising the mag-

net up from the wearing plate, allowing the iron to drop off.

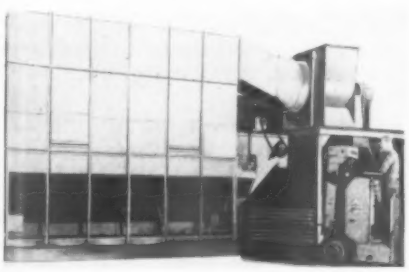
Scaling Hammer: Rotor Tool Co., 17325 Euclid Ave., Cleveland 12—Scaling hammer with lever throttle for weld flux scaling, weld spatter removal, paint scaling, rust removal, etc., can be held and operat-



ed in one hand. The lever throttle is designed so that light pressure on the lever meters sufficient air for light work, heavier pressure gives full power. Exhaust air from the tool cleans the work of chips and scale. Chisels furnished in blanks, flats and spoon shapes, and star drills from 3/16 to 3/4 in. are easily inserted and removed from hammer by thumb pressure.

Induction Motors: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30—Wound-rotor induction motors of open drip-proof construction are available in ratings of 1 to 15 hp and for 25, 50 or 60 cycle, two and three phase, 208, 220, 440 and 550 v current at various speeds. The motors may be used wherever adjustable speed is required or where high starting torque with low starting current is necessary. Self-sealed, prelubricated ball bearings have a special lubricant sealed in at the factory and further lubrication is said to be unnecessary for five years.

Dust Arrester: Schmieg Industries Inc., 302 Piquette Ave., Detroit 2—New 30,000 cfm centri-merge



swirl type arrester made of stainless steel is used to remove dust and dirt from shakeout stations, sand handling and conditioning systems. Sludge disposal is by a skid on a lift truck. The conveyor drive is on top of the conveyor spout. Unit is said to occupy a minimum of floor space.

INDIVIDUAL JOB COSTS

Does your present Cost System enable you to figure INDIVIDUAL JOB COSTS, thus insuring a profit on every casting handled in your foundry—or—are you relying on antiquated methods of costing which can supply only an overall picture of your average casting costs?

If yours is the latter method, you are OVERESTIMATING ON PROFITABLE WORK causing its placement elsewhere, and UNDERESTIMATING ON UNPROFITABLE WORK, getting it, and consequently suffering a loss.

Why not inquire about our system which will permit you to PREDETERMINE COSTS and hence GUARANTEE PROFITS.

COST CONTROL
WESTOVER ENGINEERS
Westover ENGINEERS
FOUNDRY MANAGEMENT CONSULTANTS
424 E. WELLS STREET PHONE BROADWAY 6401
MILWAUKEE 2, WISCONSIN

NO DUST HERE

WEDRON
FINE SILICA SANDS

FOR EVERY FOUNDRY NEED

- ROUND GRAIN SANDS ARE EASY ON CORE BOXES
- FINE MESH SANDS ARE IDEAL FOR LIGHT METAL CASTING
- SILICA FLOUR • WEDRON COARSE BLASTING SAND

WE OPERATE THROUGHOUT THE YEAR

WEDRON SILICA COMPANY

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT
38 SOUTH DEARBORN STREET, CHICAGO 3, ILLINOIS

Plastic PATTERNS NOW

Our specially developed techniques and practices now make plastic patterns practical and a reality for production use. Numerous foundries, who have been using these low-cost pattern plates for some time, find them definitely superior. Our plastics are adaptable for duplication of single shrink patterns, duplication of broken aluminum patterns, master patterns, cope and drag sections and core boxes.

Let us make a "PLASTIPLATE" pattern for you. A trial will convince you of the advantages. Write for Bulletin "F" or phone for complete information.

LOOK FOR THE NAME

"PLASTIPLATE"

TO IDENTIFY PLASTIC PATTERNS OF OUR DESIGN

REPRESENTATIVES IN FOLLOWING CITIES:

MICHIGAN MANUFACTURERS SERVICE, INC.
414 Book Building
Detroit, 26, Michigan

MISSOURI PATTERN WORKS, INC.
4143 Laclede Avenue
St. Louis, 8, Missouri

ATLAS PLASTIC & ALUMINUM PRESSURE PLATE CO.
4813 North 124th Street
Butler, Wisconsin

PLASTIC CORPORATION OF CHICAGO

2444 South Central Ave., Cicero 50, Ill.
Phone: LAwndale 1-2661

...TRADE PUBLICATIONS...

FURNACE HOOD: American Air Filter Co., First and Central Ave., Louisville 8—Dust control bulletin 278A describes the company's furnace hood used in combination with its dust collector to control dust and smoke from electric melting furnaces. Detailed photographs of the hood, which can be varied in design to fit any make of furnace, are contained in the booklet along with installation photographs and descriptive data.

MATERIALS HANDLING: Clark Equipment Co., Industrial Truck Division, 258 Champion St., Battle Creek, Mich.—Leaflet features a tabulated summary of principal specifications of the company's fork lift trucks, towing tractors and tructractor models. Dimensions, weights, capacities and turning radii are given for all models, both gas and battery-powered.

FOUNDRY EQUIPMENT: Newaygo Engineering Co., Newaygo, Mich.—Bulletin 204 illustrates and describes foundry equipment including aerators, conveyer belt takeups, core crushers, core drawing machines, line markers, sand conditioning mills, mold conveyors, rotary plate feeders, sand gates, sand handling systems and turntables.

MANAGEMENT SERVICE: John A. Patton Management Engineers Inc., 176 West Adams St., Chicago 3—Copy of a report dealing with low productivity in a manufacturing plant and suggesting the correct approach to correct the condition is offered as an example of management service to industry.

COMPANY DESCRIPTION: Dresser Industries Inc., 1130 Terminal Tower, Cleveland 13—Pocket size booklet tells who the company is, what it makes and how it operates. It lists Dresser's 13 operating companies and identifies the products and services of each.

FLASKS: Industrial Fabricating Inc., 817 Hall St., Eaton Rapids, Mich.— Catalog 5-48 contains construction details and illustrations of the company's steel plate flasks. Steel jackets, bottom boards, core plates, flask upsets, flask pins, stub pins and bushings also are described.

ACCIDENT PREVENTION: Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12—Guide to accident prevention also lists company's products and tells where to use, how to use, how to maintain and how to select industrial protective equipment.

METAL ROOFING: International Nickel Co., 67 Wall St., New York 5—Illustrated booklet contains data on a new, soft-temper Monel roofing sheet as part of a general discussion of the qualities required for a lasting roof with minimum maintenance. A section is devoted to the product's adaptability to current architectural and roofing designs and practices.

ANNUAL REVIEW: Allis-Chalmers Mfg. Co., 1126 South 70th St., Milwaukee 1—Company's 1947 Annual Review which also celebrates its hundredth anniversary describes Allis-Chalmers activities in a number of industries as well as in national defense and research.

PROTECTIVE OIL: Oakite Products Inc., 157 Thames St., New York 6—Service report provides data concerning the company's special protective oil designed to provide rust protection of metal parts in production, in storage or while awaiting shipment.

BELT GRINDERS: Porter-Cable Co., 1714 North Salina St., Syracuse 8, N. Y.—Miniature catalog of vest-pocket size describes company's complete line of abrasive belt machines and portable electric tools. It contains specifications and suggested applications.

WELDING NEWS: Hobart Brothers Co., Hobart Square, Troy, O.—"Hobart Arc Welding News" contains photographs and articles on the activities of arc welders all over the country. The company's arc welding equipment is illustrated and described.

HOUSE ORGAN: Ajax Electric Co., Frankford Ave. at Delaware Ave., Philadephia 23—External house organ, "Tips and Trends," is devoted to reporting experiences in the field of salt bath heat treating and processing.

MAINTENANCE: Stonhard Co., Dept. F, 500 Stonhard Bldg., 1306 Spring Garden St., Philadelphia 23—Maintenance folder covers building maintenance problems from foundation to roof and explains how repairs can be made simply and economically.

PIG IRON: Jackson Iron & Steel Co., Jackson, O.—Bulletin describes briefly the manufacture of the company's silvery pig iron, lists its constituents and outlines its uses in the foundry industry.

VIBRATORS: Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13—Catalog 104 describes and illustrates air valves and fittings, and pneumatic vibrators of various designs for a number of uses.

ABRASIVE POINTS: Bay State Abrasive Products Co., Farmer St., Westboro, Mass—Folder describes and illustrates the company's abrasive wheels and points.

CLEANER: E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33—Product data sheet covers the company's nontoxic emulsion cleaner for ferrous and nonferrous metals.

AROUND THE WORLD... GLOBE H-C CHILLED SHOT AND GLOBE CORNERED GRIT

ARE THE PERFECT ABRASIVE TEAM FOR FAST, ECONOMICAL BLAST CLEANING...

GLOBE'S SPECIAL MANUFACTURING PROCESSES AND 37 YEARS OF METALLURGICAL EXPERIENCE ASSURE

GLOBE

UNIFORM SIZE... UNIFORM HARDNESS... RUGGED DUSTPROOF PERFORMANCE... ALL

SIZES GRADED TO S.A.E. SPECIFICATIONS.... FOR INFORMATION WRITE....

MEMBER

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

GLOBE
STEEL ABRASIVE CO.
MANSFIELD, OHIO

YOUR CASTING SALVAGE JOBS MAY NOT BE THIS DRAMATIC, BUT...

Read how NI-ROD came to the rescue of a badly broken block!

It looked like "curtains" for this cylinder block of a much-needed tractor motor.

Many shops might have scrapped it rather than have attempted to make repairs.

But this shop knew about Ni-Rod.*

They fitted the fractured parts together carefully. Then, with 1/8" Ni-Rod electrodes, they welded them securely in place.

Result: the motor block was restored to its original soundness, and the tractor was put back in service.

FOR NEW CASTINGS, TOO

Many foundries keep Ni-Rod handy to salvage defective castings. Such imperfections as porosity, blow-holes, underflush areas, and chill fractures are easily remedied with Ni-Rod.

Ni-Rod welds are strong, color-matching, and easily-machinable. Preheating is seldom necessary, slag removal is easy, and Ni-Rod gives you smooth bead contours. Experienced welders say: *"You can't beat Ni-Rod for strong, crack-free welds in cast iron!"*

Ni-Rod comes in 3/32", 1/8", 5/32", and 3/16" diameters. Order a five-pound package from your distributor—and see for yourself how easy it is to make on-the-spot casting repairs.

*Reg. U. S. Pat. Off.

EMBLEM OF SERVICE
INCO NI-ROD
TRADE MARK

FREE—new 8-page welding booklet. Mail the coupon! →

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

Mr. Jim Ryan
The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.

Please mail my copy of: *"NI-ROD . . . a new electrode for any cast iron welding."*

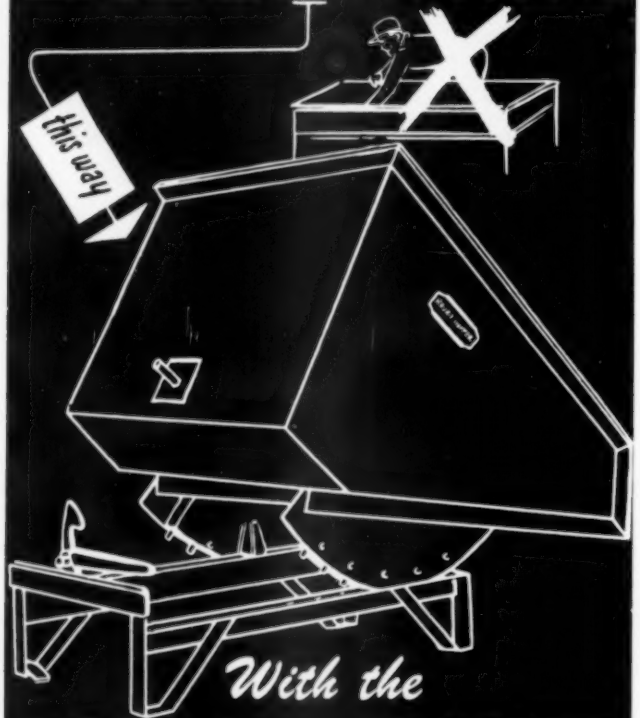
Name_____

Company_____ T.F. 8-'48

Address_____

City_____ Zone_____ State_____

Save 50% LABOR-TIME



With the

ROURA *self-dumping* HOPPER

With the Exclusive Instant Release (Patent Pending) Handle

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in *much* less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Ford, Champion Porcelain, General Electric, National Carbon, International Harvester, etc.

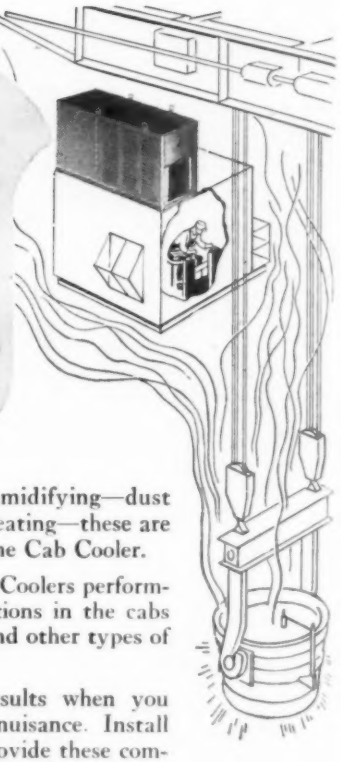
By a simple lift of the *exclusive* release handle, the ROURA HOPPER dumps, rights, and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

Write today for detailed brochure, "In Dollars & Sense."

ROURA IRON WORKS, Inc.
1407 Woodland Ave. Detroit 11, Mich.

DRAVO CRANE CAB COOLERS

PERFORM EVERY AIR CONDITIONING FUNCTION



Cooling—fume removal—dehumidifying—dust filtering—ventilating—winter heating—these are the functions of the Dravo Crane Cab Cooler.

You will find Dravo Crane Cab Coolers performing these air conditioning functions in the cabs of soaking pit, ladle, stripper, and other types of hot-metal cranes.

And you will observe real results when you eliminate heat fatigue and fume nuisance. Install Dravo Crane Cab Coolers to provide these comfortable working conditions in the cabs of hot-metal cranes.

DRAVO CORPORATION
PITTSBURGH · PHILADELPHIA · CLEVELAND · NEW YORK
CHICAGO · DETROIT · ATLANTA · BOSTON
Sales Representatives in Principal Cities

DRAVO

BLACKEN MOLDS *FASTER AND BETTER*

with the **MURPHY PISTOL SPRAYER**

ELIMINATES SWAB, BRUSH and SPRAY CAN

BLACKENING REACHES HIDDEN POCKETS
MOLDS ARE BLACKENED FASTER
CASTINGS PEEL BETTER
WORK COMES CLEANER
Satisfactory Performance Guaranteed or Money Back

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

Used for Silica wash, oil, water or any liquid material. For sand-blast cleaning. As a blow gun for cleaning motors and machinery. If your dealer cannot supply you at once, order direct from manufacturer below. Literature on request.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

IT'S NEW—IT'S SENSATIONAL

AMASTEEL

GENUINE ALLOY STEEL SHOT

LASTS MANY TIMES LONGER

Here at last is peak efficiency in Shot for blast CLEANING and PEENING. AMASTEEL SHOT is far better than ordinary hard iron abrasives because it is TRUE ALLOY STEEL.

Compared to regular blasting materials, AMASTEEL offers an amazing superiority due to its long life and resistance to breakdown and greater CLEANING and PEENING speed. This feature means additional savings on labor, handling, storage, freight costs, and dust disposal.

AMASTEEL is produced under exclusive patents and is available in sizes that meet all CLEANING and PEENING requirements.

Investigate AMASTEEL Shot today. It Lasts Six Times As Long!

PRODUCERS OF
PEENBLAST
CLEANBLAST
ALLOY 99

ALLOY METAL ABRASIVE CO.

311 WEST HURON ST. ANN ARBOR, MICH.

-from the Carolinas to Canada

foundrymen have learned that when a need is required with speed . . we're still batting .999 with our quarter-century-old boast of . . .

Everything
for the Foundry
and we do mean
"EVERYTHING"

PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.

ASHLAND & EAST LEWIS STREETS

PHILADELPHIA 24 Telephone JE 5-1012

order National BRAND

BENTONITE

highest FOUNDRY *quality*

Prompt shipment—unlimited quantities now available to foundries from BAROID—the world's largest producer of Bentonite. Our modern plants are geared to fulfill every requirement of the foundry trade.

From THESE APPROVED DISTRIBUTORS

American Cyanamid Co.
New York, New York

The Asbury Graphite Mills, Inc.
Asbury, New Jersey

Barada & Page, Inc.
Kansas City, Missouri (main office)
Also—(Branches)
Tulsa, Okla.
Oklahoma City, Okla.
Wichita, Kansas
Dallas, Texas
Houston, Texas
New Orleans, La.

G. W. Bryant Core Sands, Inc.
McConnellsville, New York

Canadian Industries, Ltd.
Montreal, Quebec, Canada
(all branches)

Casco S. de R. L.
Mexico, D. F.

The Foundries Materials Co.
Coldwater, Michigan
Also Detroit, Mich.

Foundry Service Company
North Birmingham, Alabama

Foundry Supplies Co.
Chicago, Illinois

Thomas H. Gregg Company
Milwaukee, Wisconsin

Independent Foundry Supply Co.
Los Angeles, California

Industrial Foundry Supply Co.
San Francisco, California

Klein-Farris Co., Inc.
Boston, Massachusetts

LaGrand Industrial Supply Co.
Portland, Oregon

Marthens Company
Moline, Illinois

Carl F. Miller & Co.
Seattle, Washington

Pennsylvania Foundry Supply & Sand Co.
Philadelphia, Pennsylvania

Robbins & Bohr
Chattanooga, Tennessee

Smith-Sharpe Company
Minneapolis, Minnesota

Southwest Foundry Supply Co.
Houston, Texas

Mr. B. J. Steelman
Chicago, Illinois

Stoller Chemical Co.
Akron, Ohio

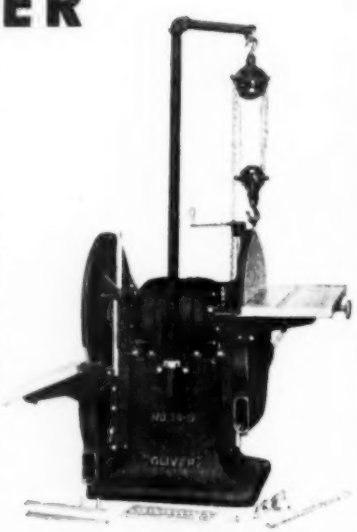
Wehenn Abrasive Co.
Chicago, Illinois

Mr. Walter A. Zeis
Webster Groves, Missouri

baroid SALES DIVISION • NATIONAL LEAD COMPANY
BENTONITE SALES OFFICE: RAILWAY EXCHANGE BUILDING, CHICAGO 4, ILL.

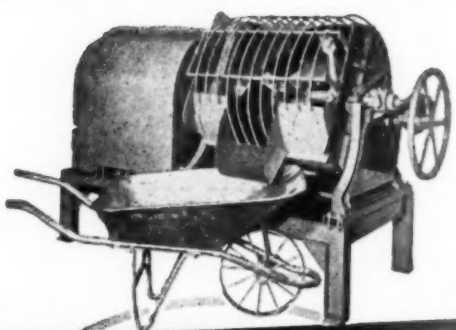
Patternmakers: Sand circles and angles, large and small . . . nails and all

"OLIVER"
DOUBLE DISK
SANDER



This "Oliver" Sander smooths up end grain, removes saw marks, sands down nails and screws in patterns. Unmatched for accurate circle and angle sanding. Has two disks of 30" (24", if desired) diameter. Equipped with motor-in-head or belt drive. Tables have 8" vertical adjustment, tilt up to 45° to outside of machine, 10° to inside. Accurate graduations and indicators. Also furnished as a Disk and Spindle Sander. *Write for Bulletin No. 34DD.*

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

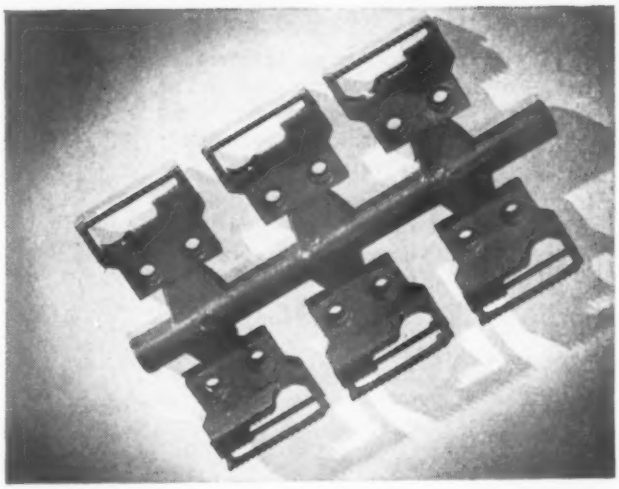


BLYSTONE
• MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO.
549 W. Washington Boulevard, Chicago, Illinois

FOUND!



"Lost Wax" casting is more precise—costs less with ZYROX Pattern Waxes

Here's a good example of the high precision that can be obtained by using ZYROX Pattern Waxes for "Lost Wax" casting patterns. These small sewing machine parts have close tolerances, a satin-textured surface, and need no finishing other than cutting away the sprue.

Six years of foundry experience have established ZYROX Pattern Waxes as the dependable low-cost industrial wax for "Lost Wax" castings. ZYROX Pattern Waxes provide dimensional stability, no distortion, and accurate reproduction of die surfaces to produce precision parts at less over-all cost.

Now "Lost Wax" casting with ZYROX Pattern Waxes offers you new freedom in the design of intricate precision parts. Alloys impossible to forge or machine can be cast to tolerances of ±.003 inch per inch in parts weighing up to 20 pounds and measuring 15 inches in length.

For information on ZYROX Pattern Waxes in "Lost Wax" casting, write to Department H-1.

The Term "ZYROX" is a Trade-Mark Identifying Chlorinated Condensation Resins and Compounds Made by

HALOWAX PRODUCTS DIVISION

Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N.Y.

HERE'S *Real* WEARING EASE WITH APPROVED PROTECTION FOR THE *SANDBLASTER!*

The New **M. S. A.**

BLASTFOE

ABRASIVE HELMET

U. S. BUREAU OF MINES-*APPROVED*

This new Helmet features lightweight construction (weighs less than 4½ lbs.)—durable, rubber hood—rigid aluminum headpiece—comfortable suspended-hammock head gear—bump-proof flow control valve—large area, screen protected window permitting wide angle of vision. The loose-fitting positive pressure design of the M.S.A. Blastfoe Abrasive Helmet brings new comfort to the foundry shot or sand-blast operator, and its many practical features will be best appreciated under arduous service conditions. Write for the detailed story in descriptive Bulletin No. CS-22!

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STS. • PITTSBURGH 8, PA.

District Representatives in Principal Cities

In Canada: MINE SAFETY APPLIANCES COMPANY OF CANADA LIMITED, TORONTO
Montreal . . . Vancouver . . . Calgary . . . Winnipeg . . . New Glasgow, N. S.

LADLES

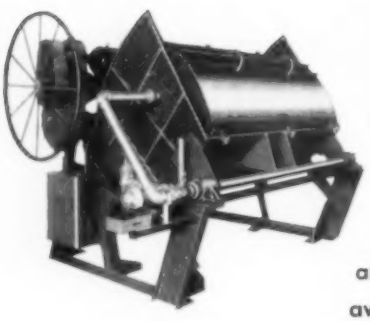
ALL CAPACITIES
ALL TYPES
Including

Timken worm geared Ladles with *Industrial's* patented distortion-proof, self-locking design

BOWLS

PRESSED STEEL
WELDED STEEL
RIVETED STEEL
Including

flat bottom, round bottom, and teapot spout types



SPECIAL EQUIPMENT

Special geared motor driven mixing ladle, an example of custom-build pouring and handling equipment available at INDUSTRIAL

SHANKS, TONGS, BAILS and CUPOLA EQUIPMENT in ALL TYPES

Industrial
EQUIPMENT COMPANY
115 N. OHIO ST. MINSTER 2, OHIO

LATEST CATALOG AVAILABLE

LOOK AT WELLMAN

If you need to increase production and want quality patterns made by experts, take a look at our facilities:

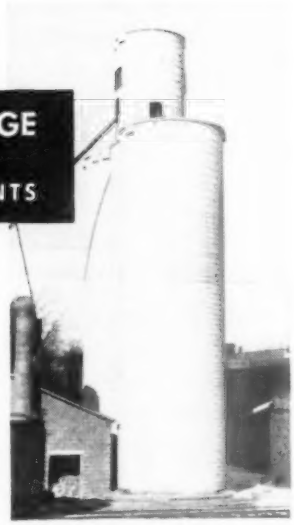
Modern Pattern Shop Equipment
36 Years of Experience
Careful attention to Details
Expert Workmanship

You are cordially invited to inspect our facilities to produce Well-made patterns, or write the address below.

WELL-CAST MAGNESIUM, ALUMINUM AND BRONZE CASTINGS

WELLMAN
BRONZE & ALUMINUM COMPANY
2502 EAST 93rd STREET • CLEVELAND, OHIO

VERTICAL STORAGE THAT DEFIES THE ELEMENTS



Neff & Fry Bins Built For Little Elevator Co., Rockford, Ohio

During the last 32 years, Neff & Fry Storage Bins have withstood practically everything Nature offers . . . heat, cold, moisture, corrosion . . . even fire and storm. This is due to the stonelike properties of N & F Super-Concrete Staves, plus the erection technique.

The staves have matching grooved and beaded edges. Each stave interlocks with six adjacent ones. For contents which must be kept dry, dampproofing is accomplished by buttering the edges of the staves with mastic compound, coating the inside and outside of the bin with neat cement, and then adding two coats of waterproofing compound to the outside. To withstand internal pressure, the structure is bound with galvanized steel rings, as illustrated in the accompanying photograph.

If you are interested in storage bins which last for generations, get all the facts about Neff & Fry Super-Concrete Stave Bins. Complete information is yours for the asking. Write, wire, or phone.

THE NEFF & FRY COMPANY, CAMDEN, OHIO

NEFF & FRY STORAGE BINS

ACCEPTED

BY AMERICA'S LARGEST INDUSTRIAL PLANTS TO DO THE TOUGHEST BLASTING AND PEENING OPERATIONS

HI-GRADE METALLIC

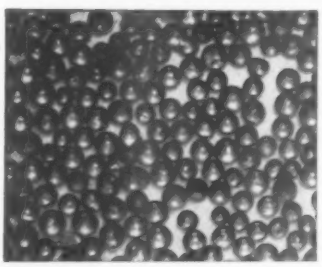
FAMOUS

FOR ITS ABILITY TO STAND UP UNDER REPEATED HARD USE

SHOT AND GRIT

- ROUND
- UNIFORM IN SIZE
- UNIFORM IN HARDNESS
- LACKS IRREGULAR SHAPES

- RECTANGULAR
- SHARP
- TOUGH
- DURABLE



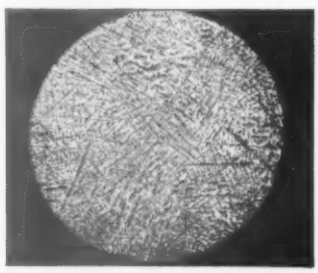
UNRETOUCHED PHOTO OF HI-GRADE SHOT

CLAYTON-SHERMAN ABRASIVES COMPANY

3896 LONYO ROAD

DETROIT 10, MICHIGAN

CEdar 7200

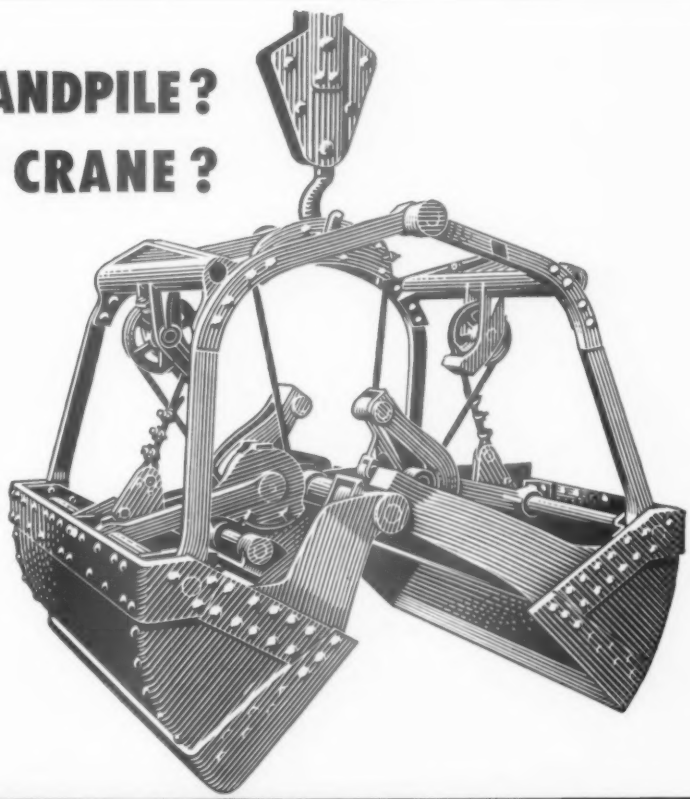


MICROSCOPIC STRUCTURE OF METAL

HOW HIGH IS YOUR SANDPILE?

HOW LOW IS YOUR CRANE?

Here's a Blaw-Knox Single Line, Hook-On Type Bucket that needs only 6' 7" operating headroom! Perhaps one of the 4 sizes of this design will prove exactly what you need for efficient handling of moulders' sand, coke, slack coal or other loose bulk materials. You'll find it fully described in Catalog 2232, which will be forwarded immediately on request.



BLAW-KNOX DIVISION

OF BLAW-KNOX COMPANY

2097 FARMERS BANK BUILDING

PITTSBURGH 22, PA.

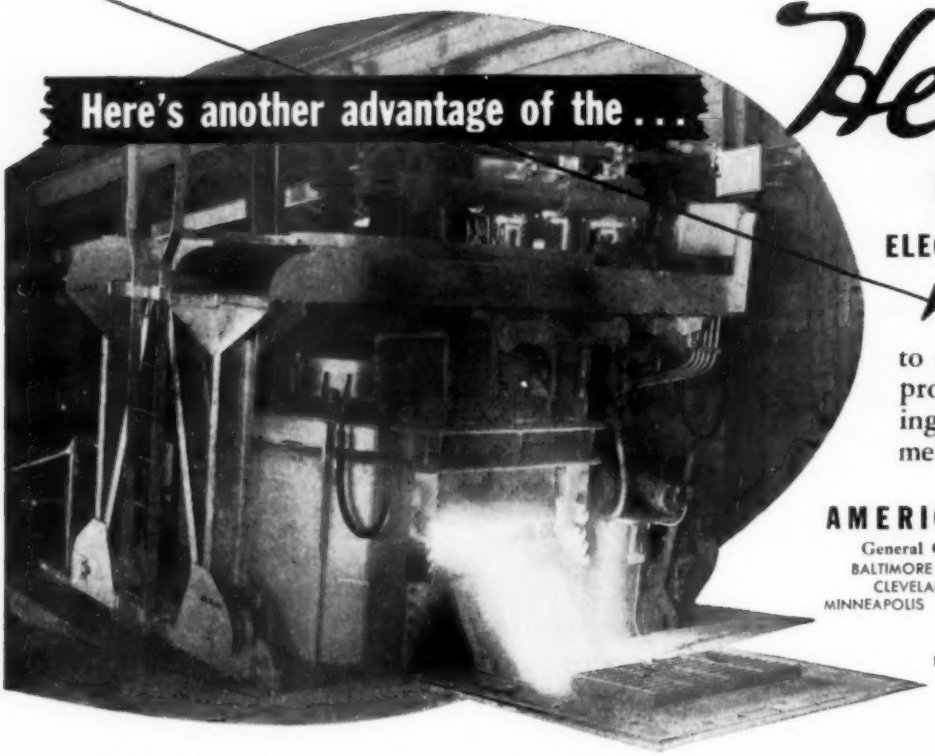
BLAW-KNOX FOUNDRY BUCKETS

Here's another advantage of the . . .

Heroult

GANTRY-TYPE

ELECTRIC MELTING FURNACE



Platform is attached to and tilts with the furnace, providing continuous working area during charging and melting.

AMERICAN BRIDGE COMPANY

General Offices: *Frick Building, Pittsburgh, Pa.*
BALTIMORE · BOSTON · CHICAGO · CINCINNATI
CLEVELAND · DENVER · DETROIT · DULUTH
MINNEAPOLIS · NEW YORK · PHILADELPHIA · ST. LOUIS
Columbia Steel Company, San Francisco,
Pacific Coast Distributors
United States Steel Export Company, New York

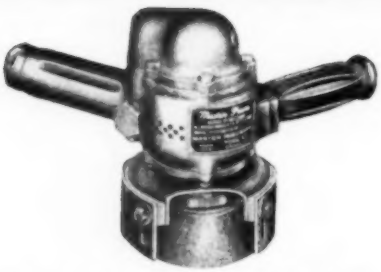
Write for your free copy of the new Heroult Catalog.

AMERICAN BRIDGE COMPANY · USS · Heroult · FURNACES · UNITED STATES STEEL

UNITED STATES STEEL

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES • SERVICE • STOCK • COAST TO COAST

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

A "blend" with JISCO is sound metallurgy.

HIGH SILICON IRON JISCO

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO

BAT THIS AROUND:

Clean castings sell better because they look better

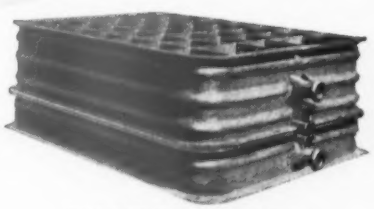
Quality foundry facings bring about cleaner castings

BLOOMSBURY FOUNDRY FACINGS *are all high quality* FREE SAMPLES SENT ON REQUEST

B

BLOOMSBURY GRAPHITE CO. BLOOMSBURY. N.J. SINCE 1882

HEADQUARTERS FOR STEEL FOUNDRY FLASKS



Model CH-40 Truscon Flask for Extra Heavy Duty.

There's a Truscon Steel Flask for Every Need!

Model TM-10 Truscon Flask for Two-Man Handling.

Truscon's Pressed Steel Division—nationally known for the quality of its products and the dependability of its service—is fully equipped and prepared to handle your foundry flask requirements. The Pressed Steel Division's central location assures efficient service for your needs. Write for free catalogs describing Truscon Steel Foundry Flasks.

TRUSCON
STEEL FOUNDRY FLASKS

Model OM-1 Truscon Flask for One-Man Handling.

TRUSCON STEEL CO., Pressed Steel Division • 6100 Truscon Ave., Cleveland, Ohio • Subsidiary of Republic Steel Corporation

★ Sharper Castings

★ Greater Brinell Hardness

★ Increase Tensile Strength

★ Increase Transverse Strength

★ Increase Wear Resistance

★ Increase Heat Resistance

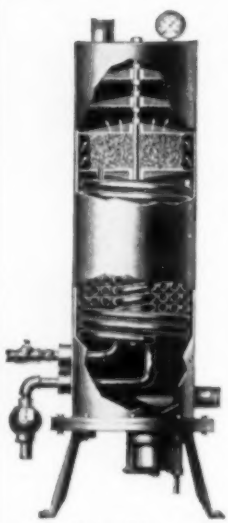
Copper Shot

IMPROVES YOUR IRON

ALTER COMPANY Fifty Years of Service

1702 Rockingham Road, Davenport, Iowa

DELIVER COMPRESSED AIR



Capacities
50 to 2000 CFFAPM
Sizes
1" to 4"

COOL • CLEAN • DRY
TO POINT OF USE

★

INSTALL A MURPHY A. S. F.

★

Guaranteed not alone to cool, clean and dry compressed air, but to deliver it so to point of use.

Built in 1", 1½", 2", 3", and 4" sizes, with capacities of 50 to 2,000 CFFAPM.

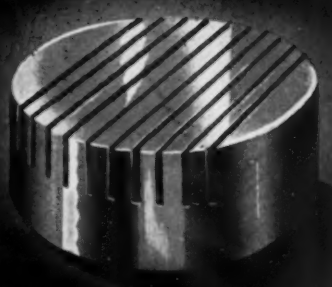
Completely automatic and highly efficient. Guaranteed to perform as advertised or money back. Write for literature and prices.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SPECIFICATION CIRCULAR ON REQUEST

Wm. DEMMLER & Bros.
Kewanee, Illinois

QUALITY • DEPENDABILITY • SERVICE
Producers of
PressureProof

ANGELL ANGELL

CHAPLETS
and all types of nails

The Angell Nail
& CHAPLET COMPANY

4580 East 71st Street Cleveland 5, Ohio

Always Available!
AN IDEAL FUEL FOR DRYING MOLDS

● Leading foundries everywhere can depend on Ford Charcoal Briquets for drying molds because of their year 'round availability. Ford Charcoal Briquets give you all these important advantages, too—portable, dry, penetrating heat . . . minimum fines or breakage . . . burn uniformly for a longer time.

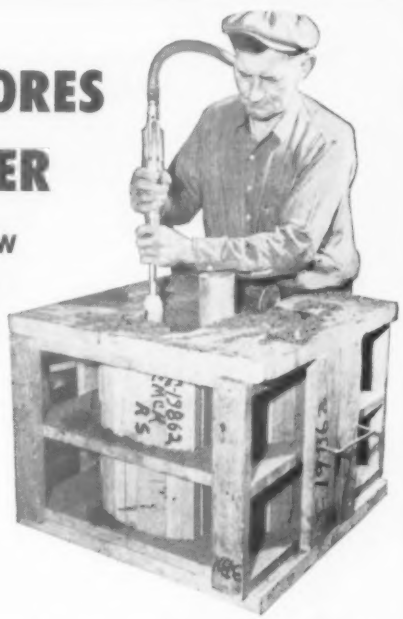
Get the favorite foundry fuel for drying molds . . . pre-heating castings . . . as a cover on molten metal.

Order now from your distributor, or write the Ford Motor Company, Sales Department, Iron Mountain, Michigan.

Ford

Charcoal Briquets
The *heat-packed* charcoal

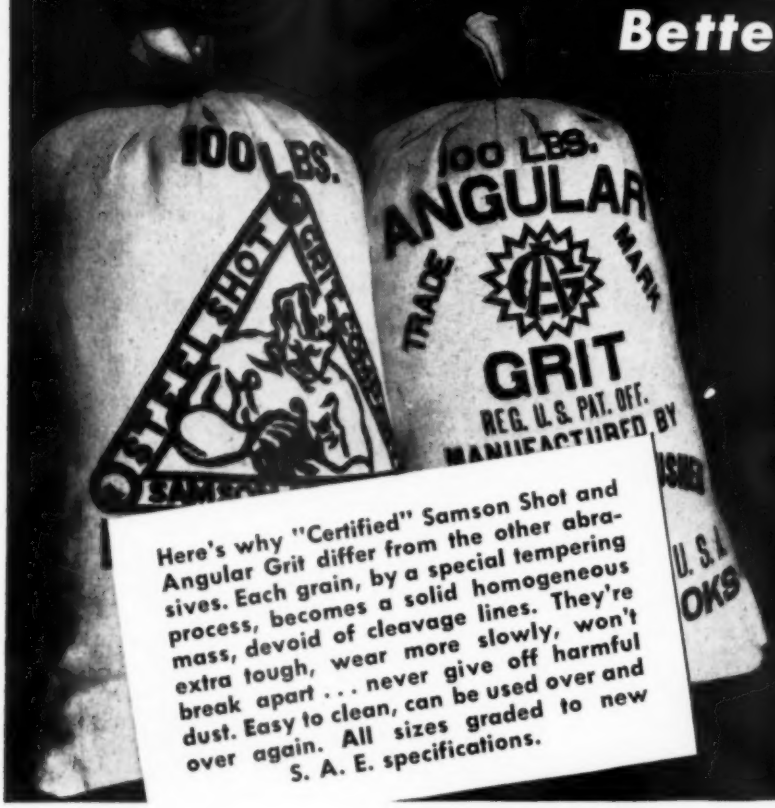
RAM CORES FASTER
with the New
ROTOR
No 22-B



ITS blows are fast and snappy. Hard-packs core sand much faster than previous rammers. Light weight, easy to handle. A type for every job. Call in the Rotor Analyst to demonstrate the model to match your work.

THE ROTOR TOOL CO.
CLEVELAND, OHIO

IT'S IN THE BAG . . . The Answer for Better Blast Cleaning:



Here's why "Certified" Samson Shot and Angular Grit differ from the other abrasives. Each grain, by a special tempering process, becomes a solid homogeneous mass, devoid of cleavage lines. They're extra tough, wear more slowly, won't break apart . . . never give off harmful dust. Easy to clean, can be used over and over again. All sizes graded to new S. A. E. specifications.

Always Specify

"CERTIFIED" ABRASIVES

from **Pittsburgh Crushed Steel Co.**
PITTSBURGH, PENNA.

Steel Shot & Grit Co.
BOSTON, MASS.

DOUBLE YOUR PRODUCTION—with the fastest and most powerful Rammer made—

NO. 4 DAYTON RING VALVE BENCH RAMMER

Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES Send for Bulletin No. 300.

DAYTON PNEUMATIC TOOL CO., DAYTON, O.

PENN BUCKETS

No. 5-A
Self Dumping

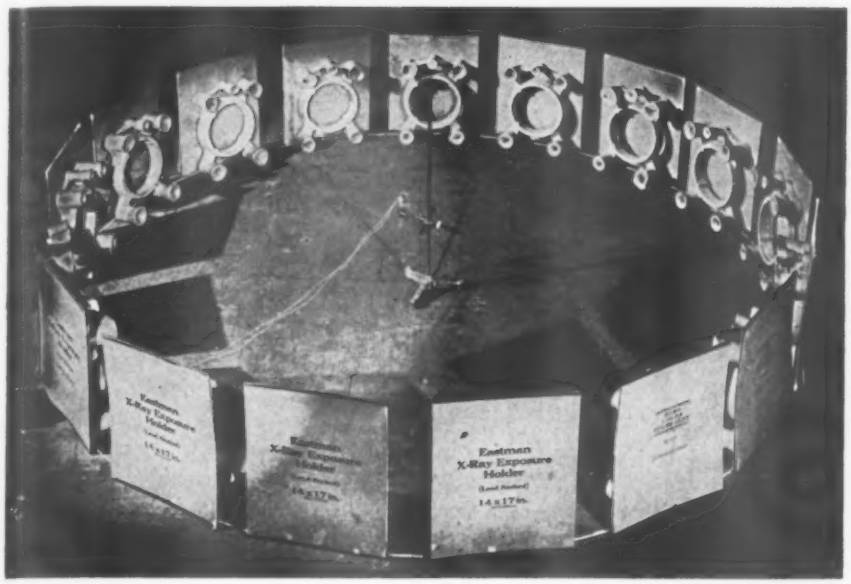
Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

MEMBER

WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS
READING, PENNA.

RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION



PHOTOGRAPH COURTESY OF CRANE CO.

Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance; heavy load storage containers and slide rule exposure calculators.

RADIUM CHEMICAL COMPANY, INC. • 570 Lexington Ave., New York (22), N. Y. • Chicago: Marshall Field Annex Bldg.

BESSEMER FERRO-SILICONS

GLOBE IRON COMPANY

THE PIONEERS OF SILVERY IRON

SPECIAL HIGH SILICON GRADES

YOU CAN'T THINK OF SILVERY IRON WITHOUT THINKING of GLOBE

GLOBE IRON CO JACKSON, O.

LOOK to Bosworth

FOR LEADERSHIP IN THE SELF-POWERED LOADING AND CONVEYING FIELD! The Bosworth Line of Conveying and Loading Equipment is complete in every detail. If you believe in progressive, modern business then *look to Bosworth*.

THE CLEVELAND FORMGRADER CO.

6723 DENISON AVE., CLEVELAND 2, O.

Gentlemen:
Please send me a complete catolog.

NAME_____

COMPANY_____

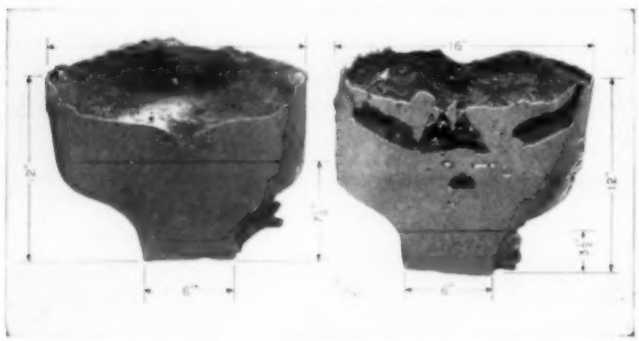
ADDRESS_____

CITY_____ STATE_____

SOFFEL'S CARBON FREE *Liquidizer*

KEEPS METAL MOLTEN 50% LONGER

FOR FERROUS AND NON-FERROUS METALS



RISER ON LEFT, THROUGH THE ACTION OF SOFFEL'S CARBON FREE LIQUIDIZER, CONTAINS TWICE AS MUCH SOUND METAL AS THE HEAD ON THE RIGHT, ON WHICH A COMMON INSULATING PIPE ELIMINATOR WAS USED.

These risers, made in the same mold, illustrate how SOFFEL'S CARBON FREE LIQUIDIZER produces sounder castings and saves metal.

STEEL INGOT YIELD INCREASED BY 4% AND MORE

One of the many steel ingot producers using SOFFEL'S CARBON FREE LIQUIDIZER has found that the application of the material on "hot-top" ingots increased their yield 4% and resulted in a saving of $4.00 per ton of steel in the production of ingots. For every ten cents invested in SOFFEL'S CARBON FREE LIQUIDIZER, one dollar was returned in savings.

These amazing results were due to the action of SOFFEL'S CARBON FREE LIQUIDIZER. When applied on molten steel, the LIQUIDIZER enters into an exothermic reaction which produces a temperature of over 3200°F. The heat generated raises the temperature of the feeding metal in the hot-top and causes it to remain fluid 50% longer. After the exothermic reaction has ceased, the LIQUIDIZER forms a soft, insulating cover on the metal, thus confining the heat and further delaying solidification. By prolonging the fluidity of the metal in the hot-tops, the "piping" is eliminated from the ingot body. This greatly reduces "croppage" scrap.

NOTICE: SOFFEL'S CARBON FREE LIQUIDIZER is guaranteed not to contaminate any metals or alloys in any way.

BEWARE OF IMITATIONS! We are the originators of Carbon-Free Liquidizers!

PITTSBURGH METALS PURIFYING CO.
1352 Marvista St., N. S. Pittsburgh 12, Pa. U.S.A.

RUEMELIN *Blast Cleaning* CABINETS

Ruemelin Sand Blast Cabinets are designed for use in the smaller gray iron, brass or aluminum foundries. Built in many sizes. Furnished complete with dust control equipment. A Rotary Barrel 16" in diameter can be installed in any of these cabinets to clean very small parts automatically.

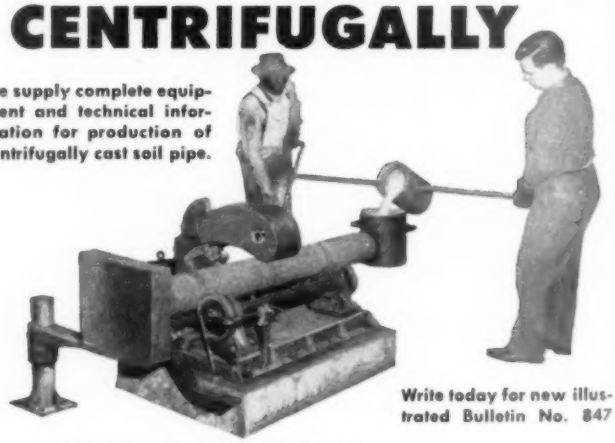
Write for Bulletin No. 32-B

RUEMELIN MANUFACTURING CO.
3850 N. PALMER ST. • MILWAUKEE 12, WIS., U. S. A.
Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 5135-1/9A

CAST SOIL PIPE CENTRIFUGALLY

We supply complete equipment and technical information for production of centrifugally cast soil pipe.



Write today for new illustrated Bulletin No. 847

This Modern Method Provides for:

- Production Uniformity
- Perfectly Concentric Pipe
- No Sand Blasting or Other Cleaning Necessary
- Use of Unskilled Labor
- Small Man-Hour Labor Cost
- High Production with Low Investment
- Pipe Sizes from 2-inch Diameter Upwards

CENTRIFUGAL CASTING MACHINE CO.
P. O. Box 947 *Nathan Janco, Pres.* Tulsa 1, Okla.

THE NEW, LOW-PRICED

BUSS NO. 208

Single Surface Wood Planer

PERFECT FOR PATTERN SHOPS

Here's a planer that is big enough to handle practically anything you'll want to plane (capacity 20" wide x 8" thick); that will give you absolute accuracy and do the job in jig time; that's thoroughly complete, including sectional infeed roll, sectional chipbreaker, 4 driven rolls, fully enclosed motors, knife grinding-jointing attachment; available in various rates of feed and built to give trouble-free service — all at an amazingly low price. There never has been a wood planer that so completely fills the needs of the modern pattern shop. Write for complete details.

One of a complete line of single and double surface wood planers—all built by planer specialists.

BUSS MACHINE WORKS 250 EIGHTH ST. HOLLAND, MICH.

No other coating

LASTS

like

CO-LOIDAL-AC *Pattern Lacquer*

Protect your patterns *permanently* against warping and swelling. CO-LOIDAL-AC insulates against moisture and heat. And it resists abrasion and mechanical damage. Because of complete dispersion of solids, this lacquer never settles—is ready for use after years of storage.

Available in gallons, five gallons and drums. Order direct from factory.

American Lacquer Solvents Co.

Perkiomen Junction, Phoenixville, Pa.

COLORS — Clear, Red, Black and Yellow — also Thinner.

The "BRANFORD" FLASK RAPPER continues to pile up testimonials

"BRANFORD"

"The Vibrator with the Kick"

A LARGE FOUNDRY IN PENN. REPORTS ON THEIR 8" "BRANFORD" RAPPER—

"We are now shaking out a cylinder cope 10'x8'x4' in 18 minutes with 2 men that formerly took seven men 105 minutes."

FROM MISSOURI COMES THIS REPORT—

"Equipment paid for itself in 3 months time by elimination of flask damage."

AND THIS ONE FROM WEST VIRGINIA—

"We might go on indefinitely praising this rapper, however you can tell the world that now we have it we would not be without it. A foundry is overlooking a big saving in not investigating the Branford Flask Rapper."

WRITE FOR CATALOG "G" DESCRIBING THE FULL LINE OF "BRANFORD" PNEUMATIC VIBRATORS, SHAKEOUT EQUIPMENT, VALVES AND FOUNDRY ACCESSORIES.

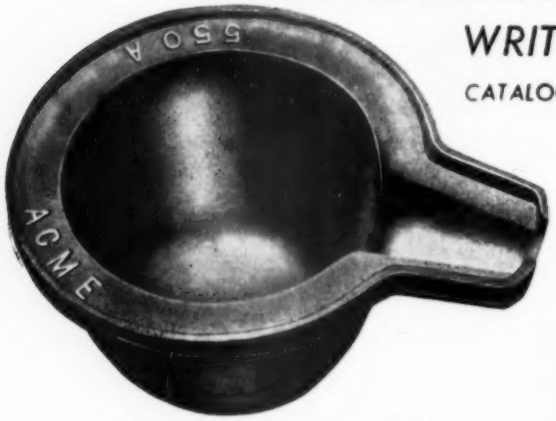
1915 BRANFORD VIBRATORS U.S.A.

New Haven Vibrator Company

130 CHESTNUT ST. NEW HAVEN 7, CONN.

MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.



ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

WRITE for
CATALOG "F"

HOLDING——→
BOWL NO. HP7001

INGOT MOLD NO. AA-6

Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

ACME FOUNDRY COMPANY

DETROIT 16, MICHIGAN

2502 TWENTY-SECOND ST. PHONE TASHMOO 5-2404

QUICKDRAW FOR PERFECT CORES *In Less Time!*

Invented by
Myron C. Kline

• No special setup or rigging necessary to produce uniform, true-to-size, handmade cores with a Quikdraw Core Machine. Lightens the coremaker's work, eliminates undersized, patched-up jobs. Small wonder why more than half our orders are repeaters from satisfied users. Write for further information.

STRATTON MANUFACTURING CO., ERIE, PA.

PENTON'S FOUNDRY LIST *for* 1947 *and* 1948

Gives names and addresses of 5993 foundries in the United States and Canada and tells the kind of castings, steel, brass or aluminum. Shows the number, kind and size of melting units operated by each plant and the total daily melting capacity—the surest indicator of the size and importance of a foundry.

Penton's Foundry List is recognized as the only list of foundries giving such valuable information arranged for quick, ready reference.

Price $50.00

THE FOUNDRY
BOOK DEPT.
1213 West 3rd St., Cleveland 13, Ohio

HELPFUL LITERATURE

***NOTE TO READERS:** If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card.*

1. Electromagnets

Dings Magnetic Separator Co.—Illustrated data sheet No. B-1802A deals with Hold-Tite electromagnet designed to hold castings during swing grinding operations. Unit, which is built in two sizes, is easily installed and maintained. It will hold any shape casting including cylindrical.

2. Cranes

Whiting Corp.—94-page illustrated loose-leaf type publication "Whiting Cranes" is composite of data sheets and folders which describe line of cranes for application in foundries as well as other industrial plants. Section is devoted to selection of proper crane, capacities, controls, safety features, erection and maintenance.

3. Core & Mold Ovens

Foundry Equipment Co.—6-page illustrated folder No. 48 presents information on twelve types of Coleman core and mold ovens available. In addition folder also shows portable mold dryers for use in drying molds which are too large for oven treatment.

4. Processing Equipment

Newcomb-Detroit Co.—4-page illustrated bulletin "Engineered Systems for Paint Finishing, Dust Collecting, Materials Handling" covers Uni-Wash collectors, air supply units, down draft benches and air washers; Scroll-Aire oven heaters; metal parts washers; air supply systems; pneumatic conveyors and other systems which are engineered to meet specifications.

5. Soldering, Heating & Brazing

Linde Air Products Co.—20-page illustrated catalog No. F-6995 is descriptive of eighteen popular air-acetylene outfits, 34 torch and soldering iron combinations, regulators, floodlights, adapters, parts and accessories for wide range of soldering, heating and brazing operations. Information is given also on how to make up an outfit to meet specific requirements.

6. Core Production Aid

Werner G. Smith Co.—6-page illustrated folder "Linoil Research Helps Make Better Cores" utilizes graph forms to present results of recent studies in five interesting problems common to all foundries. Graphs indicate how baking temperatures, moisture content, silica flour and iron oxide, and cereal binder affect tensile strength of baked cores.

7. Hardness Tester

Harry W. Dietert Co.—Illustrated data sheet "Reed Brinell Hardness Direct from the Impression" describes new hardness tester. Dial type indicator is small in size and can be used accurately.

8. Materials Handling

Barber-Greene Co.—17 x 20-inch illustrated broadside "The New 363 Portable Conveyor" describes this belt conveyor unit as being equipped with antifriction bearings throughout, adjustable for raising and lowering by means of handcrank, having balanced truck design, and featuring belt take-up through telescopic splined shaft.

9. Pneumatic Vibrators

Cleveland Vibrator Co.—12-page illustrated catalog No. 104 includes technical data and details of operating features of line of pneumatic vibrators, valves and accessory fittings. Units described are suitable for installation on shakeouts, feed bins, molding machines and hoppers.

10. Sand Conditioning Unit

Beardsley & Piper Div., Pettibone Mulliken Corp.—4-page illustrated folder "Junior Nite-Gang" contains information on this new molding sand preparing unit which is capable of screening, aerating and discharging thoroughly prepared sand at rate of 20 tons per hour anywhere within radius of 25 feet.

11. Valves

Parker Appliance Co.—48-page illustrated catalog No. 301 includes construction features, specifications and other general information on globe and needle valves, check valves, relief valves and plug valves as well as on line of valve accessories.

12. Blowers, Fans & Exhausters

General Blower Co.—16-page illustrated catalog "Lungs for Industry" provides information on turbo blowers, multiblade exhausters, roof ventilators, welding fume exhausters, spray booth fans, slow speed exhausters, high temperature fans, insulation blowing machines, furnace and light-duty blowers, and utility exhausters.

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

THE FOUNDRY
Penton Building
Readers' Service Dept. CLEVELAND 13, OHIO

THE FOUNDRY **10-48**
1213 West Third St., Cleveland 13, Ohio

1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

Please have literature circled at left sent to me.

NAME _____ TITLE _____

COMPANY _____

PRODUCTS MANUFACTURED _____

ADDRESS _____

CITY AND STATE _____

This card MUST be completely filled out. Please TYPE or PRINT.

13. Diecasting Machine

Cleveland Automatic Machine Co.—4-page illustrated folder describes model No. 200 universal high-pressure hydraulic diecasting machine. Unit can be furnished with hot metal end for casting zinc, tin or lead; as a cold chamber machine for handling aluminum, magnesium or brass or with interchangeable chamber. Design and construction features are included.

14. Electric Motors

Lima Electric Motor Co.—6-page illustrated bulletin No. MB-1 is descriptive of line of electric motors which includes dripproof, solid frame, totally enclosed, totally enclosed fan-cooled, and explosionproof models. Various models have frame sizes from No. 66 to 445. Quality steel shafts provide overload protection. Units are all ball bearing equipped, and dynamic balancing eliminates vibration.

15. Expendable Pallets

Addison-Semmes Corp.—20-page illustrated catalog "Expendable Pallet from Production to Customer" describes pallets engineered with ample capacity for load conditions and which can be disposed of when transportation is completed. Units are fabricated using any combination of corrugated paperboard decks. They permit four way truck entry and can be either single or double-faced.

16. Conveyors

Standard Conveyor Co.—12-page illustrated bulletin No. 67 shows installation of various types of conveying systems in foundries, steel mills, and machine shops. Units range from standard gravity and power operated roller conveyors, with heavy duty hexagon shaft bearings for handling steel packs weighing up to 35,000 pounds, to pneumatic tube systems designed to dispatch small parts and other items.

17. Conveyor Belting

Imperial Belting Co.—Illustrated data sheet "Sahara Belting" describes conveyor belting which has been developed to handle hot foundry sand, cement clinkers, Fuller's earth, Porocel bauxite, calcined lime, roasted ore and other hot materials. Standard Sahara belting will withstand temperatures up to 300 F and insulated Sahara belting is recommended for use where temperatures exceed 300 F.

18. Inspection Equipment

Detroit Testing Machine Co.—5-page illustrated folder "Testing Machines" is composite of five data sheets which describe Brinell hardness testers. These testing machines are available in direct-reading types for laboratory or general use as well as production operations. Standard specifications, sizes available and special equipment are charted.

19. Safety Equipment

American Optical Co.—Two illustrated data sheets describe AO R-18 face shield that can be used with respirators and AO 607 safety goggle. Face shield protects eyes and upper face against impact of foreign particles. Safety goggle is fabricated of shatter-resistant acetate lens and lightweight plastic frame.

20. Foundry Ovens

Young Brothers Co.—12-page illustrated bulletin No. 2C includes information which will aid users in selecting proper foundry oven for any given set of local conditions. Typical installations are shown. Ovens can be equipped with one of several types of conveyors and can be loaded or unloaded by means of flanged wheel cars, trucks or lift trucks. Ovens shown are available for all industrial process temperatures up to 1000 F.

21. Industrial Trucks

Hyster Co.—4-page illustrated folder "84 Foundry Uses for Hyster Trucks" is devoted to description of Karry Krane 10,000-pound capacity mobile crane unit, No. 20 lift truck having 2000-pound capacity, No. 40 lift truck with 4000-pound capacity and No. 75 lift truck having 7500-pound capacity.

22. Grinding Wheels

Bridgeport Safety Emery Wheel Co.—16-page illustrated catalog No. 147 is descriptive of various types of grinding wheels, cut-off machines, cutlery grinders, buffing lathes, vertical surface grinders and horizontal face grinders. Equipment is shown in operation and specifications are included.

23. Portable Sand Conditioner

Pettibone Mulliken Corp., Beardsley & Piper Div.—4-page illustrated folder No. 1110 contains information relative to heavy-duty portable Preparator sand conditioner. Unit provides thorough screening, lump breaking, magnetic separation and aeration. Capacity is 60 tons per hour.

24. Air Compressors

Curtis Pneumatic Machinery Div., Curtis Mfg. Co.—54-page illustrated loose-leaf type catalog No. C-92 I.S.J. is composite of eleven bulletins which reveal specifications and general operating data on line of industrial air compressors for almost every type of installation requirement.

25. Protective Equipment

Chicago Eye Shield Co.—64-page illustrated Cesco catalog not only lists company's products but also tells where to use, how to use, how to maintain and how to select industrial protective equipment. Section on spectacle type goggles gives applications and information on how they should fit and on proper care.

THE FOUNDRY 10-48
1213 West Third St., Cleveland 13, Ohio

1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

Please have literature circled at left sent to me.

NAME TITLE

COMPANY

PRODUCTS MANUFACTURED

ADDRESS

CITY AND STATE

This card MUST be completely filled out. Please TYPE or PRINT.

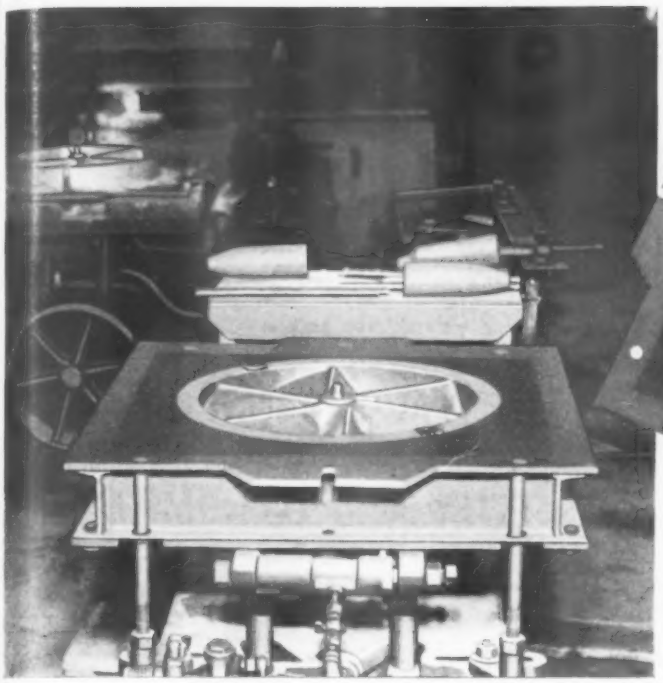
FIRST CLASS PERMIT No. 36 (Sec. 510 P.L.&R.) Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

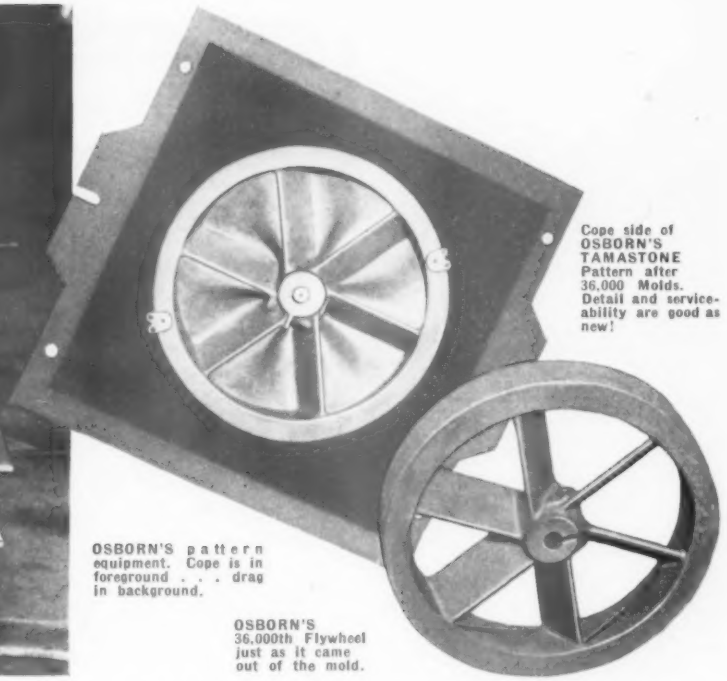
4c POSTAGE WILL BE PAID BY—

THE FOUNDRY
Penton Building
CLEVELAND 13, OHIO

Readers' Service Dept.



OSBORN'S pattern equipment. Cope is in foreground . . . drag in background.



Cope side of OSBORN'S TAMASTONE Pattern after 36,000 Molds. Detail and serviceability are good as new!

OSBORN'S 36,000th Flywheel just as it came out of the mold.

STILL GOING STRONG AFTER 36,000 MOLDS

Osborn Machine Company, DuBois, Pa., says, "We feel that TAMASTONE has saved us a considerable amount of money and regard it as a very fine product" . . . "we have made two different size flywheels both from TAMASTONE patterns. A close estimate . . . would be 29,000 of the larger wheels . . . 36,000 of the smaller size wheels".

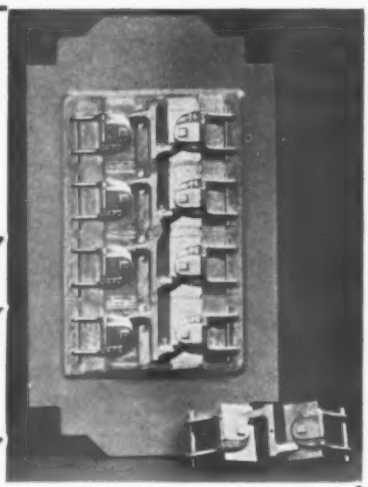
Yes, TAMASTONE is proving more and more, year after year its value as the perfect pattern compound. All users report savings . . . some increase production 400% others 600% and up! TAMASTONE cope and drag patterns or match plates can be made in your foundry by your own molder. No special accelerators, retarders, vehicles and *no special experience needed!*

How about giving TAMASTONE a trial . . . bet you save money too!

TAMMS SILICA COMPANY 228 North LaSalle Street, Chicago 1, Illinois

---

Matchplate made from single-gated pattern



Production with Accuracy

Get more output with safety. That means, with greater accuracy. Foundrymen are thus helping their profit by using our pressure-cast matchplates and cope and drag plates. Single or multiple pattern matchplates cast under pressure in plaster molds—that's the proven answer to today's urgent production needs.

Get our quotations today.

TOLEDO MATCHPLATE COMPANY
534 STATE STREET TOLEDO 2, OHIO
Affiliate—Plaster Process Castings Company Cleveland 3, Ohio

Pressure-Cast MATCHPLATES
COPE and DRAG PLATES

FOR BETTER PROTECTION AGAINST CASTING REJECTS AND MAKE-OVERS, USE—

The CLEVELAND OPEN HEAD CHAPLET

This patented chaplet gives cores more rigid support—because the open head design permits sounder packing of sand under the head and around stem.

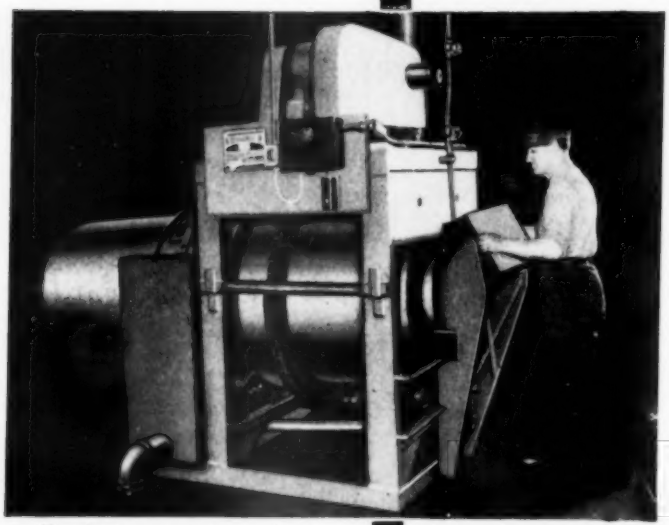
We also make Square Head Radiator Chaplets, and Stem and Double Head types for heavier work.

CLEVELAND CHAPLET & MFG. CO.
West 67th St. & N.Y.C. Ry.
CLEVELAND, O.

CLEVELAND *Since 1890* *Chaplets*

RANSOHOFF WET CLEANING MILLS

WITH AUTOMATIC STAR RETURN



Only 3 cu. ft.

and ideal for the small foundry or where space is limited

Compact and with all the amazingly efficient features of the big fellows . . . . this end-loading, end-unloading wet cleaning mill does a terrific job. . . . .

CLEANS CASTINGS

of Malleable Iron, Grey Iron, Brass or Aluminum

PERFECTLY AND ECONOMICALLY

No dust; no rust; no dust-collecting systems; no health hazards; no manual handling of stars; mills are not self-destructive.

Write for RANSOHOFF ENGINEERS to show you how to

Save 30% to 70% ON YOUR CLEANING COSTS

N. RANSOHOFF, Inc.

FIRST in metal cleaning equipment

TOWNSHIP AND BIG 4 RR — CINCINNATI 16, O.

TERRE HAUTE SPECIAL FOUNDRY COKE

★

A QUALITY PRODUCT

Sold Exclusively by

REPUBLIC COAL & COKE CO.

8 South Michigan Ave., Chicago 3, Illinois

BRANCHES, Peoria • New York • Indianapolis • Milwaukee • Minneapolis • St. Louis Detroit • Cleveland • Cincinnati • Evansville

Manufactured at Terre Haute, Indiana by INDIANA GAS & CHEMICAL CORPORATION

HIGH CALCIUM FLUXING LIMESTONE

for use in

Gray Iron Cupolas

and

Electric Furnaces

Quarry and plant at Hillsville, Pa. and Lowellville, Ohio

THE CARBON LIMESTONE COMPANY

Established 1848

Youngstown, Ohio

What are you doing to correct your SCRAP LOSS?

CROBAUGH LABORATORIES

FOUNDRY CONSULTING and METALLURGICAL SERVICE

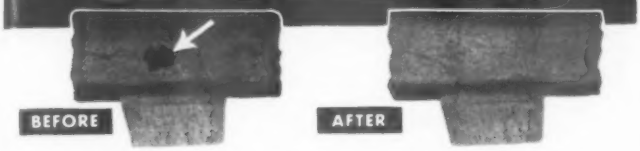
SAVES many times its cost

THE FRANK L. CROBAUGH COMPANY

1426 W. 3rd St. Cleveland 13, O. SU-4712

Over 50 years Service

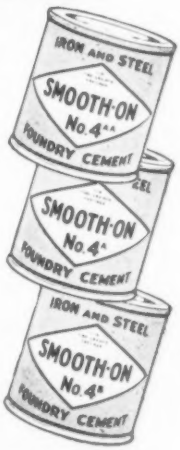
FOR CLEANER-LOOKING CASTINGS



Make surface blemishes practically invisible. Fill in shallow sand holes, blow holes, pock marks and other such imperfections with Smooth-On No. 4 Foundry Cement. It expands slightly as it hardens, becoming practically part of the casting. Will take filing. Choice of three shades to match color and texture of your casting.

LIGHT GRAY Smooth-On No. 4AA comes in 1-, 5 and 50-lb. sizes. . .MEDIUM GRAY Smooth-On No. 4A comes in 1-, 5-, 20- and 100-lb. sizes . . . .DARK GRAY Smooth-On No. 4B comes in 1-, 5-, 20- and 100-lb. sizes.

Order through your supply house—if they haven't Smooth-On Foundry Cement, write us.



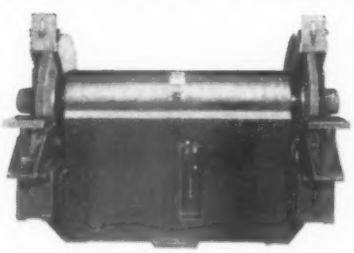
FREE SAMPLES, HANDBOOK

If you've never used Smooth-On, write us for free sample, specimens of hardened Smooth-On—all grades, and 40 page Smooth-On Repair Handbook.

SMOOTH-ON MFG. CO., Dept. 17K
570 COMMUNIPAW AVE., JERSEY CITY 4, N. J.

Do it with SMOOTH-ON FOUNDRY CEMENT

Built for HEAVY DUTY



The Marschke Vari-Speed Grinder, the largest and most efficient of all heavy duty floor stand grinders, combines massive ruggedness with the dependability of accurately controlled wheel speed.

Constant cutting speed is automatically maintained by adjustment of the work rest to the wheel diameter. This machine may also be supplied as a Multi-Speed Grinder having three wheel speeds.

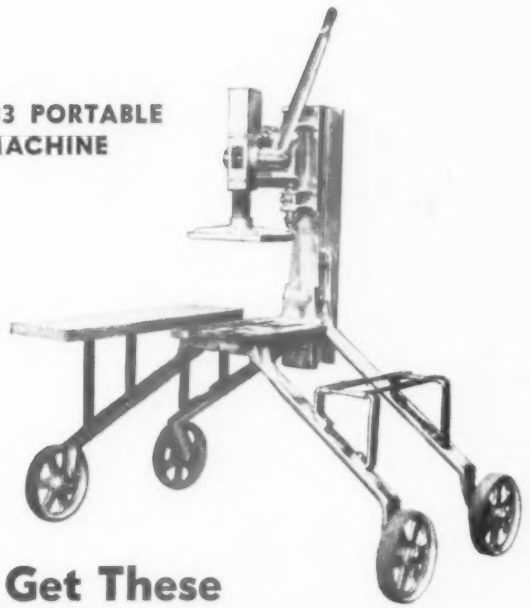
You'll want further information on the Vari-Speed Grinder or other Marschke Grinders which include pedestal and floor stand grinders and buffers, heavy duty Swing Frames and the "In-Between" Grinder.

Write today for complete details

VONNEGUT MOULDER CORPORATION

1839 Madison Avenue — Indianapolis, Indiana

NO. 33 PORTABLE MACHINE



You Get These Advantages With

Moline MOLDING MACHINES

1. The high cost of compressed air is eliminated. All working parts are above the table: consequently, sand cannot get into the mechanism.
2. Require a minimum amount of floor space—only 25 sq. in. for No. 11 Stationary Machine.
3. Approximately one-half the number of working parts as compared with many other types of molding machines.
4. The swinging arm is balanced on hardened steel centers. Can be swung at the will of the operator.
5. Parts are made of steel, malleable iron, and semi-steel castings, thus insuring long and economical service.
6. Can handle flasks as large as 16" x 30". Have high quality aluminum enamel finish which makes them rust resistant.

●

WE SHIP QUICK!

MIW

MOLINE IRON WORKS
MOLINE, ILLINOIS, U.S.A.

SERVING the FOUNDRY

SMILLIE

A SPECIFIC TYPE FOR EVERY CORE BOX

CORE BOX VENTS

SLOTTED OR SCREEN

DEEP HEAD
Wide or Narrow Slots
.014 .010

SHALLOW HEAD
Wide or Narrow Slots
.014 .010

.035 MESH

INSERTING DRILLS for inserting Core Vents

• Uniformity of holes • Faster insertion of vent • Correct Depth

VENT CLEANER for cleaning slots

MADE OF TEMPERED STEEL, EASY TO USE

C.M. SMILLIE & CO.

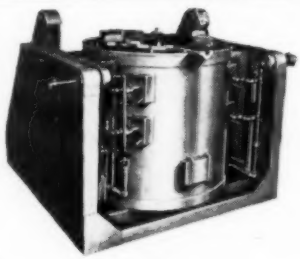
1124 WOODWARD HGTS., FERNDALE 20, MICHIGAN
TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

NON-FERROUS METAL MELTING FURNACES

SELECTION TABLE

	TYPE	Max. Temp.	Series	Recommended for	Bulletin No.
TILTING	CRUCIBLE	2500°F.	TCR	Melting Brass and Copper	TC-45
		1400°F.	TCA	Melting Aluminum	TC-45
	POT	1400°F.	TP	Melting Aluminum and Magnesium	TP-45
STATIONARY	CRUCIBLE	2500°F.	CR	Melting Brass and Copper	CR-45
		1400°F.	AC	Melting Aluminum	AC-45
	POT	1400°F.	AM	Melting Aluminum	AM-45
		1200°F.	SM	Melting Soft Metals	AM-45
		1000°F.	SA SAV	Melting Soft Metals	SV-45

26348



WRITE FOR COMPLETE SPECIFICATIONS

'Surface' Standard Rated FURNACES

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

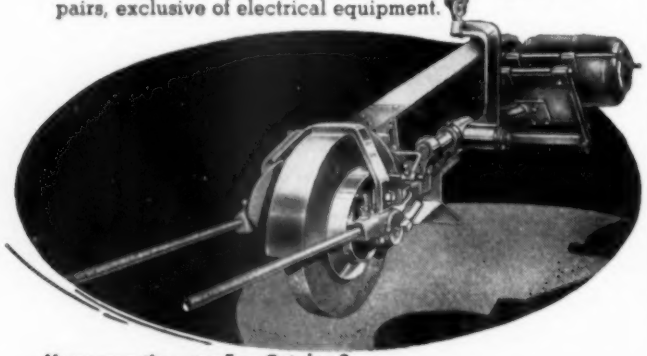
FOX

SWING FRAME GRINDER

• **BALANCE** Perfect center balance of wheel and motor ensures grinding ease and efficiency.

• **SAFETY** "Worker safety" is carefully provided.

• **ECONOMY** Greasing required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.



Have you the new Fox Catalog?

FOX GRINDERS, INC.

OLIVER BUILDING PITTSBURGH 22, PA.

OBERLAENDER SAND CO.

SINCE 1914

Producers of Molding Core & Special Sands

MILLED · DRIED · PIT RUN

Sands for quick bonding and grain size controlling systems where a lowering of permeability is desired in aluminum, gray iron and malleable foundries.

PHONE: MOLINE-2453

MOLINE, ILLINOIS

FOUNDRY

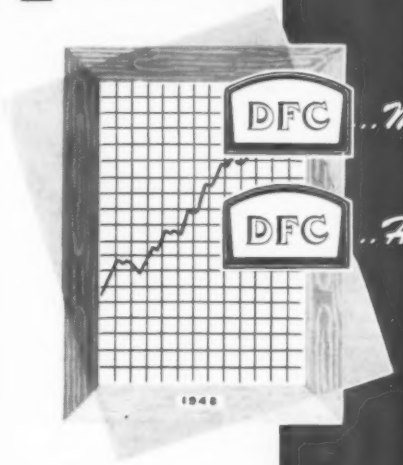
EDWIN S. CARMAN, INC.,

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

Sound Engineering Principles Practically Applied to Foundry Operations

ENGINEERS

INCREASE PRODUCTION



with
..Melting furnaces
..Heat Treating furnaces

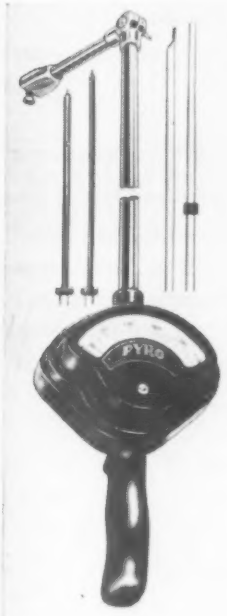
The Denver Fire Clay Company manufactures an extensive line of gas and oil fired industrial furnaces.

The selection undoubtedly contains a furnace you have been looking for.

Investigate DFC Furnaces—write for our new Furnace Catalog today . . .

The DENVER FIRE CLAY Company
EL PASO, TEXAS · NEW YORK, N.Y. · SALT LAKE CITY, UTAH
DFC
DENVER, COLO., U.S.A.

PYRO



Better Temperature Control for non-ferrous foundries!

● Use the new PYRO Immersion Pyrometer

Accurate temperature control is a must to assure low cost production of UNIFORM, SOUND CASTINGS. And that's why the new PYRO Immersion Pyrometer is indispensable in any modern non-ferrous foundry—in crucibles, furnaces, ladles.

The PYRO Immersion Pyrometer is shock-proof, moisture-proof, dust-proof—immune to magnetic influences—and will withstand roughest handling. Has shielded steel housing. "Protected Type" and "Bare Metal" thermocouples are instantly interchangeable, without adjustment or recalibration. Large, 4-inch scale is easy to read. Equipped with exclusive LOCK SWIVEL. Ranges 0-1500 and 0-2500° F.

Write for FREE Catalog No. 150

Measure Foundry Temperatures Accurately . . . at a glance!

Use The Simplified PYRO Optical Pyrometer

SELF-CONTAINED—No correction charts, no accessories, no upkeep, *Direct reading.*

ACCURATE—New concentrated test-mark plus easy operation permit unusually *close* and *rapid* temperature determination—even on *minute spots, fast-moving objects* and *smallest streams.* ("Special Foundry Type" and "Triple Range" also have RED Correction Scale to determine *true spout* and *pouring* temperatures of molten steel and iron when measured in the open.)

LIGHT IN WEIGHT—Weighs only 3 lbs. complete.

AVAILABLE IN 5 RANGES from 1400°-7500° F.

PROVED IN USE—Foundrymen everywhere swear by it.

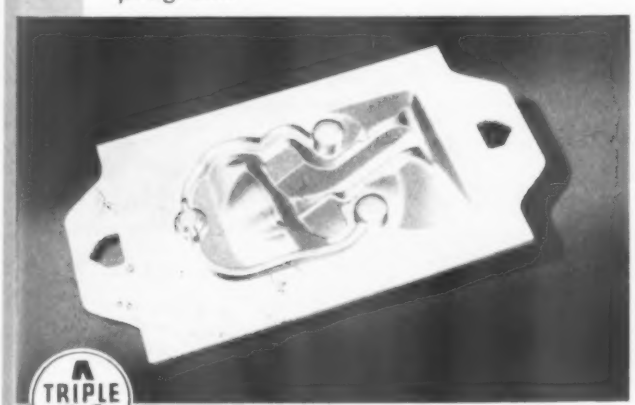
Write for FREE CATALOG #80

Manufacturers of PYRO Optical, Radiation, Immersion and Surface Pyrometers for over 25 years

THE PYROMETER INSTRUMENT CO.
NEW Plant and Laboratory, Bergenfield 6, New Jersey

- COPE and DRAG PLATES
- CORE BOXES
- MATCH PLATES
- PATTERN INSERTS
- WOOD PATTERNS

18 years as pattern specialists. Facilities to handle your entire pattern program.



TRIPLE A®

PATTERNS by *Acme*

ACME ALUMINUM ALLOYS, INC.
200 N. Findlay St., Dayton 3, Ohio

ALL GRADES OF WASHED, DRIED, SCREENED

SILICA FOUNDRY SANDS

Produced from the celebrated Ottawa District St. Peter Sandstone.

Steel Molding Sand • Core Sand • Blast Sand • Furnace Bottom Sand • Opener Sand for Aluminum and Magnesium Castings • Silica Flour

MICROSIL

STANDARD SILICA CORPORATION

CHICAGO AND OTTAWA, ILLINOIS

DISTRIBUTORS IN ALL PRINCIPAL CITIES

BLACKHAWK SILICA SAND

WILLIAMS "HOOK-ON" SINGLE LINE BUCKET

SPECIAL TYPE *for* FOUNDRY SERVICE

The Williams "Hook-on" Single Line Bucket is designed especially for foundry service in 3/8 to 2 cubic yard capacities. Its many features of design and construction are described in an illustrated bulletin sent free on request. Write

THE WELLMAN ENGINEERING CO. • CLEVELAND, OHIO

if you use molasses in your foundry — switch now to U.S.I.'s molasses product

SPECIAL LIQUID CURBAY

it's low priced!

USI for further data, write: Special Products Dept. INDUSTRIAL CHEMICALS, INC. 60 East 42nd St., New York 17, N. Y.

3/4 SIZE

Severance CARBIDE MIDGET MILLS

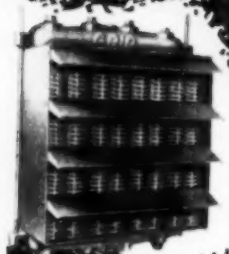
Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C

Write for Catalog No. 16

May be REGROUND time-after-time by Severance—savings are thus multiplied

SEVERANCE TOOL INDUSTRIES, INC.
753 Iowa Ave., Saginaw, Michigan

HERE'S EQUIPMENT DESIGNED TO WITHSTAND THOSE CONDITIONS IN *foundries* THAT MAKE SPACE HEATING A HEADACHE!!



GRID

has operated for 17 years without maintenance!

HIGH TEST CAST IRON HEATING SECTIONS

In GRID Unit Heaters there is more "free" area per foot of heating space than in any other . . . no clogging from dust or atmospheric conditions . . . easy to keep clean, GRID Unit Heaters are designed for low outlet temperatures and more air delivery to the floor line—not the ceiling.

GRID heating sections are one piece construction high test cast iron—the metal for permanency—and more resistant to corrosive gases . . . no rotting away of heating elements, no leakage due to corroded joints or connections . . . no electrolysis because no dissimilar metals are used in GRID construction. No maintenance expense, but years of trouble-free heating service, proven by the 17 years that GRID Unit Heaters have operated successfully in steel mills.

Write for complete details, capacity tables and engineering data.

D. J. MURRAY MANUFACTURING CO.
WAUSAU WISCONSIN

AMERICAN BRITISH CHEMICAL SUPPLIES, Inc.
180 MADISON AVE. NEW YORK 16, N. Y.

Invites you to write for your free copies of A.B.C. Suggestion Sheets for Melting Aluminum, Brass, Bronze & Grey Iron Alloys

A.B.C. FOUNDRATES, FLUXES & COATINGS
(TRADE MARK REG.)
FOR THE MELTING & CASTING INDUSTRY

EF

GAS, OIL AND ELECTRIC
FURNACES

For all annealing and heat treating requirements

THE ELECTRIC FURNACE CO. • SALEM, OHIO

Foseco Feedol Facts

you can count on AND CHECK!

Write for your free sample!

- Acts automatically.
- Increases temperature of metal.
- Retains metal in liquid state.
- Allows reduction of height and volume in feeding heads.

FOUNDRY SERVICES INC.
280 MADISON AVENUE, NEW YORK 16, N. Y.

INFORMATIVE AND INSTRUCTIVE

BOOKS

Select the Ones You Need at Once!

Handbook on Cupola Operation

Every foundry operating a cupola will find this volume highly valuable. ..... *Price,* $5.50

An Introduction to Metallurgy, Second Edition

By Prof. Jos. Newton. An elementary treatment of the subject, stressing principles rather than practices, and intended for classroom instruction. ..... *Price,* $5.50

Magnesium

By Pidgeon, Mathes, Woldman, Winkler and Loose. Discusses such topics as structural design, castings, corrosion and protection, and methods of fabrication. ..... *Price,* $3.50

Modern Blast Cleaning and Ventilation

By C. A. Reams. Casting cleaning methods presented and discussed in detail. Also abrasive selection and use. ..... *Price,* $4.00

Tales from the Gangway

A rollicking series of articles that contain practical solutions to everyday foundry problems. Written as only Pat Dwyer could do it. ..... *Price,* $1.00

Alloy Cast Irons

Second edition. Thoroughly covers the subject in theory and actual foundry practices. ..... *Price,* $3.25

ANALYSIS OF CASTING DEFECTS

To help foundrymen minimize and eliminate defective castings. Thirty-one basic casting defects are listed and described. Defects are defined simply and completely, illustrated by 101 figures collected from foundries of the United States and Canada.

Price $2.75

Centrifugal Castings

Provides a complete picture of this popular method of casting. ..... *Price,* $3.00

Recommended Practices for the Sand Casting of Nonferrous Alloys

A new book, just off the presses that will prove invaluable to nonferrous foundrymen. ..... *Price,* $3.00

Cast Metals Handbook

A complete authoritative reference book dealing with all cast metals. . . steel, malleable, nonferrous and gray iron. ..... *Price,* $6.00

Impact Cleaning

By Wm. A. Rosenberger. A compendium of impact cleaning information. Recommended methods. ..... *Price,* $7.00

Metallurgy of Steel Castings

By Charles W. Briggs. Detailed information on technical and metallurgical control in producing quality steel castings. ..... *Price,* $6.50

Foundry Sand Testing Handbook

The accepted standard reference book on methods of testing and grading foundry sands and clays. ..... *Price,* $3.50

A.F.A. SAFETY AND HYGIENE CODES

Code of Recommended Practices for Testing and Measuring Air Flow in Exhaust Systems..Price, $1.00

Code of Recommended Good Safety Practices for the Protection of Foundry Workers.....Price, $2.50

Code of Recommended Practices for Industrial Housekeeping and Sanitation .....Price, $1.50

ORDER YOUR COPIES TODAY

THE FOUNDRY—Book Department—1213 West Third St., Cleveland 13, Ohio

Please send (postpaid) the following books I have checked.

Enclosed is $ .....*. ☐ Money Order; ☐ Check; ☐ Company Order A.F.A. SAFETY AND HYGIENE CODES:

- ☐ Analysis of Casting Defects, $2.75.
- ☐ Handbook on Cupola Operation, $5.50.
- ☐ An Introduction to Metallurgy, $5.50.
- ☐ Magnesium, $3.50.
- ☐ Modern Blast Cleaning and Ventilation, $4.00.
- ☐ Tales from the Gangway, $1.00.
- ☐ Impact Cleaning, $7.00.
- ☐ Alloy Cast Irons, $3.25.
- ☐ Centrifugal Castings, $3.00.
- ☐ Recommended Practices for the Sand Casting of Nonferrous Alloys, $3.00.
- ☐ Cast Metals Handbook, $6.00.
- ☐ Metallurgy of Steel Castings, $6.50.
- ☐ Foundry Sand Testing Handbook, $3.50.

A.F.A. Safety and Hygiene Codes:

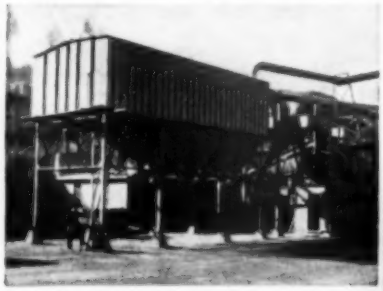
- ☐ Testing and Measuring Air Flow in Exhaust System, $1.00.
- ☐ Protection of Foundry Workers, $2.50.
- ☐ Industrial Housekeeping and Sanitation, $1.50.

NAME .....

ADDRESS .....

CITY ..... **STATE** .....

* Orders for delivery in Ohio must be accompanied by 3% additional to cover the compulsory state sales tax.



28 years experience in designing, building and installing dust-control equipment is at your service. Call for one of our engineers, or write for free booklet . . . "Mastery of the Air".

SAND BLASTING EQUIPMENT

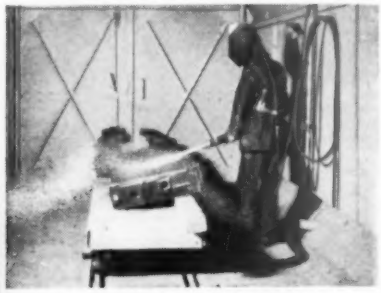
· DUST ARRESTORS ·

Reasonable Delivery.

Parsons

ENGINEERING CORP.

2345 EAST 79th ST. CLEVELAND 4, OHIO



Parsons blast rooms, suction cabinets, oscillating blast barrels and accessories, do the job faster . . . better. Custom built to give year after year service, and trouble-free operation.

EMPIRE THAT GOOD **By-Product Coke:**

★ FOR FOUNDRY • METALLURGICAL • CHEMICAL • WATER GAS • DOMESTIC USES ★

PHONE 3-9135

DeBARDELEBEN COAL CORPORATION

Transportation Building BIRMINGHAM 3, ALA.

DeBardeleben Preparation and Service Give Added Value

FOR SALE—PIG IRON

Monthly deliveries starting November

Analysis	Si	2.5/3.5%	Mn	.4/.7%	
	Ph	1.2/1.6%	S	.05%	max.
		C 3.5/4%			

Write: Box No. 227

THE FOUNDRY, 16 East 43rd St., New York, N. Y.

GREENE ELECTRIC

MELTING FURNACES

ARC furnaces for melting steel, iron and malleable.

INDUCTION furnaces for melting and holding aluminum.

HEARTH furnaces for ore reduction.

GREENE ELECTRIC FURNACE CO.

2702 6th Ave. South Seattle 4, Wash.

CORE VENTING is No Problem FOR BUFFALO BRAND VENT WAX

The quickest, surest way to eliminate costly losses of castings due to core blowing is to *provide* cores with an ample amount of clean, positive vents. That's why Buffalo Brand Vent Wax has been in use in so many leading foundries for more than thirty-five years. Made in two shapes and eighteen sizes to meet any venting requirements. Write for sample today!

Buffalo Brand VENT WAX

UNITED COMPOUND COMPANY

328 South Park Ave., Buffalo 4, N.Y.

PRODUCERS CORE SAND CORPORATION

PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN

MICHIGAN CITY, INDIANA

CHEMISTS and METALLURGISTS

Grey Iron Foundry Consultants

Complete Foundry Testing

Established over 25 years

A. H. PUTNAM COMPANY

Rock Island, Illinois

CUT LADLE HEATING TIME BY AT LEAST 75 PER CENT

Single Ladle Heater with fuel tank and adjustable burner stand.

HAUCK

VENTURI-HIGH PRESSURE

OIL BURNERS

Simple — portable — smokeless — safe — quick heating. Light without preheating — burn any oil fuel. Get ladles ready for pouring faster. Save time and money in every foundry.

Single and double burner equipments in 4 sizes. Write for Catalog 1043 on ladles, heaters, mold dryers, cupola lighters.

HAUCK MFG. CO., 106 Tenth St., Brooklyn 15, N. Y.

WHERE-TO-BUY

The following classified list of products of the advertisers in THE FOUNDRY is conducted for the convenience of our readers in quickly locating sources of foundry equipment and supplies

ABRASIVE (Bricks and Files)

Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Stratford, Conn.
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.

ABRASIVE CLOTH and PAPER

Behr-Manning Div. of Norton Co., Worcester 6, Mass.
Carborundum Co., Niagara Falls, N. Y.

ABRASIVE CUTOFF MACHINES

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

ABRASIVE DISCS

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

ABRASIVE (Metallic)—See SHOT and GRIT

ABRASIVE WHEELS

Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Stratford, Conn.
Carborundum Co. Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division. Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.
United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y.

ACETYLENE (Cylinders and Tanks)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

AFTERCOOLERS (Compressed Air)

Jas. A. Murphy & Co., Hamilton, O.

AIR COMPRESSORS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Fuller Company, Catasauqua, Pa.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.
Spencer Turbine Co., Hartford, Conn.

AIR CONDITIONING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Schmieg Industries, 6560 Cass Ave., Detroit 2, Mich.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

AIR CONTROL EQUIPMENT

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.
American Air Filter Co., Louisville 8, Ky.
Foxboro Company, Foxboro, Mass.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Murphy, Jas. A., & Co., Hamilton, O.

AIRLESS BLAST CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

AIR LINE LUBRICATORS

Cleco Division of Reed Roller Bit Co., Houston, Texas.
Independent Pneumatic Tool Co., Aurora, Ill.

ALLOYS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Cerium Metals Corp., 522 5th Ave., New York 17, N. Y.
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Frontier Bronze Corp., 818 Elmwood Ave., Niagara Falls, N. Y.
General Cerium Co., 1038 River Road, Edgewater, N. J.
Globe Iron Co., Jackson, O.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Ohio Ferro-Alloys Corp. Canton 2, O.

ALLOYS (Ferro)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

ALUMINUM and ALUMINUM ALLOYS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Frontier Bronze Corp., 818 Elmwood Ave., Niagara Falls, N. Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

ALUMINUM AND ALUMINUM ALLOYS (Cont'd.)

Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

ALUMINUM INGOTS

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.
Cleveland Electro Metals Co., West 38th St. & NP R.R., Cleveland 13, O.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
U.S. Reduction Co., E. Chicago, Indiana

ANNEALING BASKETS

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING BOXES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING CORES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING FURNACES (Electric)

Ajax Electrothermic Corp., Trenton, N. J.

ANNEALING POT RAPPERS

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

ANNEALING TUBES

Pressed Steel Co., Wilkes-Barre, Pa.

AERATORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

ARRESTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Gray Iron Founders Society Inc., 1010 Public Square Bldg., Cleveland 13, Ohio.
National Founders Association, 120 S. LaSalle St., Chicago 3, Ill.

BAND SAWS

Atlantic Saw Mfg. Co., New Haven, Conn.

BANDS (Snap Flask)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

BARS (Steel)

Bethlehem Steel Co., Bethlehem, Pa.

BASKETS (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

BATTERIES (Industrial)

Electric Storage Battery Co., Allegheny Ave. at 19th St., Philadelphia 3, Pa.

BEARINGS (Anti-Friction, Roller and Ball)

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Timken Roller Bearing Co., Canton 6, O.

BELTING (Conveyor, Elevator)

Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

BELTS (Power Transmission)

Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division Passaic, N. J.

BENTONITE

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Duncommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

BINS (Storage)

American Bridge Co., Pittsburgh 19, Pa.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland 5, O.
Neff & Fry, Camden, O.

BLACKING (Mold Core)

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Frederic B., Inc., Detroit 16, Mich.
United States Graphite Co. Saginaw, Mich.

BLASTING EQUIPMENT

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

BLAST METERS

Foxboro Company, Foxboro, Mass.

BLOWERS

Allis-Calmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Campbell Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
General Blower Co., Morton Grove, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.

—When writing advertisers, please mention THE FOUNDRY—

BLOWERS (Cont'd.)

Stroman Furnace & Engineering Co., Division of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

BOLTS and NUTS

American Bridge Co., Frick Bldg., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

BOND CLAY

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Ironton Fire Brick Co., Ironton, O.

BOOKS (Technical)

Penton Publishing Co., 1213 West 3rd St., Cleveland 13, O.

BOTTOM PLATES and BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.
Diamond Clamp & Flask Co. Richmond, Ind.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BOWLS and SHANKS

Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathroap Ave., Harvey, Ill.

BOXES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

BOXES (Tote)

Penn Iron Works, Reading, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

BRAKES (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

BRICK (Refractory)

Carborundum Co., Perth Amboy, N. J.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.

BRIQUETS (Alloy)

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Electro Metallurgical Sales Corp., 30 E. 42nd St. New York 17, N. Y.

BRIQUETS (Ferro Alloy)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

BRIQUETS (Silicon Carbide)

Carborundum Co., Perth Amboy, N. J.

BRIQUETING MACHINERY (Metal)

Milwaukee Foundry Equipment Co., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES

Independent Pneumatic Tool Co., Aurora, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, 0.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co. Farmers Bank, Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago. Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDING and ENGINEERING SERVICE

American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co. Minneapolis 13, Minn.
North American Mfg. Co. 445 E. 71st St., Cleveland 4, O.

BUSHINGS (Flask-Pin)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E. Canton 5, Ohio.
Smillie & Co., C. M., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON RAISER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTINGS

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

CASTING MACHINES (Centrifugal)

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTINGS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CEMENT (Metallic)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.

CEREAL BINDERS

Chas. A. Krause Milling Co., S. 43rd & Burnham Sts., Milwaukee, Wis.

CERIUM METAL

Cerium Metals Corp., 522 5th Ave., New York 17, N. Y.
General Cerium Co., 1038 River Road, Edgewater, N. J.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division. Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

CHAIN (Steel Loading)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CHAIN (Welded and Weldless)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CHAPLETS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chapet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Frederic B. Stevens, Inc. Detroit 16, Mich.

CHARCOAL (Briquets)

Ford Motor Co., Iron Mountain, Mich.

CHEMICALS

Atlantic Chemical & Metals Co. 1925 N. Kenmore, Chicago 14, Ill.
General Chemical Co., 40 Rector St., New York 6, N. Y.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.

CHEMISTS

Crobaugh Co., Frank L., Blackstone Bldg., Cleveland, Ohio.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.

CHILLS

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Corp., Port Huron, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.

CHILL NAILS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Independent Pneumatic Tool Co., Aurora, Ill.

CHROMIUM (Briquets)

Electro Metallurgical Sales Corp., 50 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAMPS (Permanent Mold)

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CLAY (Bonding)

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.

—When writing advertisers, please mention THE FOUNDRY—

CLAY STORAGE BINS

Neff & Fry, Camden, O.

CLEANING COMPOUNDS (For Core Boxes etc.)

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CLUTCHES (Magnetic)

Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.
Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O. Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

COMBUSTION EQUIPMENT

North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.

CONVEYOR DESIGN (Cont'd.)

Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.

CONVEYORS (Apron)

Logan Co., 580 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Inc., 70 Pine St., New York 5, N. Y.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky .
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chciago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 W. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chciago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Overhead) (Cont'd.)

Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Palmer-Bee Co., Westminster & G. T. R.R., Detroit 12, Mich.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COOLERS, WATER (Electric)

Ebco Mfg. Co., 401 W. Town St., Columbus 8, Ohio.

COPPER

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.
Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.

CORE BINDERS

American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., S. 43rd & Burnham St., Milwaukee, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
U. S. Industrial Chemicals Inc. 69 East 42nd St. New York 17, N. Y.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.

CORE BLOWING MACHINES (Cont'd.)

Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

CORE BOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CORE BOX VISES

Lehigh Foundries Inc., Easton, Pa.

CORE COLORING

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

CORE COMPOUND

Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.
Stratton Mfg. Co., Erie, Pa.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.
Stratton Mfg. Co., Erie, Pa.

—When writing advertisers, please mention THE FOUNDRY—

CORE OIL

Buckeye Products Co., 7022 Vine St., Cincinnati 16, O.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE PLATES (Steel, Asbestos)

Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE RODS

Bethlehem Steel Co., Bethlehem, Pa.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.

CORE SAND

Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St. Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.

CORE SAND MIXERS (Cont'd.)

Clearfield Machine Co., Clearfield, Pa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE SPRAYERS

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Landis Mfg. Co., 2305 Hilton Rd., Ferndale, Mich.
Smillie, C. M. & Co., 1100 Woodward Hights Blvd., Ferndale, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co. 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens Frederic B., Inc., Detroit 26, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United Oil Mfg. Co. 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRE STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., Westfield, N. Y.

CRANE CONTROL (Electric)

Westinghouse Electric Corp., Pittsburgh 30, Pa.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Robbins & Myers, Inc., Springfield, Ohio.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Illinois
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Robbins & Myers, Inc., Springfield, Ohio.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washinton, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Robbins & Myers, Inc. Springfield, Ohio.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Illinois
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit 7, Mich.

CRANES (Monorail)

Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Hughes-Keenan Co., Mansfield, Ohio
Orton Crane & Shovel Co., 608 S. Dearborn, Chicago, Ill.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.

CRUCIBLE LIFTERS

Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Carman, Edwin S., Lee Rd., at Mayfield, Cleveland 18, O.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

—When writing advertisers, please mention THE FOUNDRY—

CUPOLA LININGS

Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
United States Graphite Co., Saginaw, Mich.

CUPOLA SPARK ARRESTORS

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUTOFF MACHINES (Abrasive)

Bridgeport Safety Emery Wheel Co. Inc., Stratford, Conn.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CUTTING OILS

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

DARK ROOM ACCESSORIES (X-Ray)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

DARK ROOM PROCESSING (Chemical Tanks, etc.)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

DEGASIFIERS

Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.
Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
U. S. Reduction Co., E. Chicago, Indiana

DEOXIDIZERS (Ferrous)

Carborundum Co., Perth Amboy, N. J.

DESULPHURIZERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, O.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

DIE CASTING MACHINES (Cont'd.)

Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland 3, Ohio.

DIES

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

DIRECT FIRED HEATERS

Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)

Standard Electrical Tool Co., 2488 Riverside Ave., Cincinanti 4, Ohio.

DRILLS (Pneumatic)

Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Reciprocating)

Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)

Dings Magnetic Separator Co., 4720 W. McGeough, Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S 28th St., Milwaukee 4, Wis.

DUMP HOPPERS

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Bell Aircraft Corp., Niagara Falls, N. Y.

DUST ARRESTING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Reumelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Schmieg Industries, 6560 Cass Ave., Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST COLLECTOR (Shake-out)

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

DUST RECOVERY SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.

DUST RECOVERY SYSTEMS (Cont'd.)

Kirk & Blum Mfg. Co., Cincinnati 25, O.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

DYES & CHEMICALS

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS

Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chiago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

ELEVATORS (Material Handling)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Carman, Edwin S., Lee Rd. at Mayfield, Cleveland 18, O.
Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, Ohio.
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.
Reichert, W. G., Engineering Co., 1060 Broad St., Newark, N. J.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

ENGINEERING SERVICE (Permanent Mold)

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

EXHAUST SYSTEMS

American Air Filter Co., Inc. Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Propellair Inc., Springfield, O.
Schmeig Industries, 6560 Cass Ave., Detroit 2, Mich.

EXHAUST SYSTEMS (Cont'd.)

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FABRICATORS (Metal)

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

FANS

General Blower Co., Morton Grove, Ill.

FANS (Ventilating, Exhaust, Cooling, etc.)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., La Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.
Westinghouse Electric Corp., B. F. Steurtevant Div., 40 Wall St., New York 4, N. Y.

FEEDERS (Rotary)

Fuller Company, Catasauqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chcicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Dollinger Corp., 36 Centre Park, Rochester 4, N. Y.

FILTERS (Liquid)

Dollinger Corp., 36 Centre Park, Rochester 4, N. Y.

FINISHING EQUIPMENT

Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

FIRE BRICK

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Perth Amboy, N. J.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
Stevens Inc., Frederic B., Detroit 16, Mich.

FIRE CLAY

Eastern Clay Products, Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FIRESTONE

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK BUSHINGS

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

FLASK PINS

Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

FLASKS (Adjustable)

C. S. Humphrey Co., 249 2nd St., Moline, Ill.

FLASKS (Aluminum)

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. C., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Shanafelt Mfg. Co., 2623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK FITTINGS

Adams Co., Dubuque, Iowa.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK FITTINGS (Cont'd.)

Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.

FLEXIBLE SHAFT MACHINERY

Strand Co., N. A., 5001 N. Wolcott Ave., Chicago 40, Ill.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

American-British Chemical Supplies Inc., 180 Madison Ave., New York 16, N. Y.
Atlantic Chemical & Metals Co., 1925 N. Kenmore, Chicago 14, Ill.
Carbon Limestone Co., Youngstown, Ohio.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
U. S. Reduction Co., E. Chicago, Indiana

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY ENGINEERS

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.

FOUNDRY LAYOUT & METHODS

Frank D. Campbell, 332 So. Michigan Ave. Chicago, Ill.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, Ohio.
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.

FOUNDRY NAILS

Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLIES

Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.

FOUNDRY SUPPLY HOUSES

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FOUNDRY SYSTEMS

Engineering Seervice Inc., 610 West Michigan St., Milwaukee 3, Wis.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 ColumbusRd., Cleveland 13, Ohio.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Surface Combustion Corp., Toledo 7, Ohio
Wilson Industries, 38 Memorial Dr., Cambridge 42, Mass.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minnesapolis 14, Minn.

FURNACES (Annealing)

Campbell-Hausfeld Co., Harrison, Ohio.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.
Westinghouse Electric Corp., Pittsburgh 30, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.

FURNACES (Electric Melting) (Cont'd.)

Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Greene Electric Furnace Co., 2702 6th So., Seattle 4, Wash.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Wilson Industries, 38 Memorial Dr., Cambridge 42, Mass.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Wilson Industries, 38 Memorial Dr., Cambridge 42, Mass.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Westinghouse Electric Corp., Pittsburgh 30, Pa.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Malleable Annealing) (Cont'd.)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.
Stroman Furnace & Engineering Co., Div of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Surface Combustion Corp., Toledo 7, Ohio
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wilson Industries, 38 Memorial Dr., Cambridge 42, Mass.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE BOTTOMS

Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
United States Graphite Co., Saginaw, Mich.

GAGES

Acme Aluminum Alloys Inc., Dayton 3, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st Cleveland 5, O.

GAS

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

GAS BURNERS

Fisher Furnace Co., 2543 West Hubbard St., Chicago 12, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

GENERATORS (Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.
C. Walker Jones Co., 6135 Lambert St., Philadelphia 38, Pa.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

GRAPHITE

Acheson Colloids Corp., Port Huron, Mich.
Asbury Graphite Mills, Asbury, N.J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 8 East 44th St., New York 17.
Independent Pneumatic Tool Co., Aurora, Ill.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 8 East 44th St., New York 17.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Independent Pneumatic Tool Co., Aurora, Ill.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

GRINDERS (Surface, Bench, Disc, Floor)

Bridgeport Safety Emery Wheel Co, Inc., Stratford, Conn.
Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., Aurora, Ill.

GRINDERS (Surface, Bench, Disc, Floor) (Cont'd.)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co. 1740 E. 12th St., Cleveland, O.

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 8 East 44th St., New York 17.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Independent Pneumatic Tool Co., Aurora, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
Foxboro Company, Foxboro, Mass.
Claude S. Gordon Co., 300 So. Wallace, Chicago 9, Ill.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.

HEAT CONTROL AND RECORDING DEVICES (Cont'd.)

Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Gas, Oil, Electric)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Despatch Oven Co., Minneapolis 14, Minn.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Despatch Oven Co., Minneapolis 14, Minn.

HEATERS (Space, Unit, Direct Fired)

Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

HELMETS (Blasting)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.

HOISTS (Chain)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.

HOISTS (Electric)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Illinois.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Robbins & Myers, Inc., Springfield, Ohio.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS (Electric) (Cont'd.)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

HOISTS (Hand)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

INDUSTRIAL ENGINEERING SERVICE

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
American Smelting and Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., 2534 Fillmore St., Chicago 12, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR. Cleveland 13, O.
Federated Metals Div., American Smelting and Ref. Co., New York 5.
International Nickel Co., Inc., 67 Wall St., New York City 5.
R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

INOCULANTS

Carborundum Co., Perth Amboy, N. J.

INSULATORS (for Castings heads)

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

LABORATORY EQUIPMENT (Physical)

W. C. Dillon & Co. Inc., 5410 W. Harrison St., Chicago 44, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Bethlehem Steel Co., Bethlehem, Pa.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS

Whiting Corp. 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio.

LATHE CENTERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LATHES (Buffing)

Bridgeport Safety Emery Wheel Co, Inc., Stratford, Conn.

LEAD

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5.

LIMESTONE

Carbon Limestone Co., Youngstown, Ohio.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W Washington St., Chicago 6, Ill

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)

Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MACHINERY MOUNTING PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

MAGNESIUM (Ingots)

Apex Smelting Co., 2534 Fillmore St., Chicago 12, Ill.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS

Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MARKER (Castings)

Markal Co., 607 No. Western Ave., Chicago 12, Ill.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MATERIALS HANDLING

Hughes-Keenan Co., Mansfield, Ohio.
Orton Crane & Shovel Co., 608 Dearborn, Chicago, Ill.

—When writing advertisers, please mention THE FOUNDRY—

MATERIALS HANDLING DESIGN

Frank D. Campbell,
332 So. Michigan Ave.,
Chicago, Ill.

MATERIALS HANDLING (Hoists)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

MECHANICAL ENGINEERS

Frank D. Campbell,
332 So. Michigan Ave.,
Chicago, Ill.
Engineering Service Inc.,
610 West Michigan St.,
Milwaukee 3, Wis.
Giffels & Vallet, Inc.,
Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc.,
600 West Jackson Blvd.,
Chicago 3, Ill.
Reichert Engineering Co., W. G.,
1060 Broad St.,
Newark, New Jersey.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CASTING PLASTER

United States Gypsum Co.,
300 W. Adams St., Chicago, Ill.

METAL CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

METALLOGRAPHIC EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp.,
4855 West McGeoch Ave.,
Milwaukee 14, Wis.

METALLURGISTS

Crobaugh Co., Frank L.,
Blackstone Bldg., Cleveland, Ohio.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc.,
420 N. LaSalle St.,
Chicago 10, Ill.
Roots-Connersville Blower Corp.,
Connersville, Ind.

MIXERS (Core Wash)

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)

American Wheelabrator & Equipment Co., 505 S. Byrkit St.,
Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co.,
Clearfield, Pa.
Construction Machinery Co.,
Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co.,
Kingston, Pa.

MODELS (Wood)

Master Pattern Co.,
1315 Main Ave., Cleveland, Ohio.

MOLD CONVEYORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co.,
1671 W. Bruce St.,
Milwaukee 4, Wis.

MOLD CONVEYORS (Cont'd.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel,
Louisville, Ky.
Mathews Conveyer Co.,
Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co.,
Newaygo, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Foundry Equipment Co.,
1831 Columbus Rd.,
Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Newcomb-Detroit Co., Inc.,
5741 Russell St., Detroit 11, Mich.
Young Bros. Co., 6508 Mack Ave., Detroit 7, Mich.
Ross Engineering Corp., J. O.,
350 Madison Ave.,
New York 17, N. Y.

MOLD TRUCKS (Power Operated)

Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.

MOLDING MACHINES

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div.,
Rockwell Mfg. Co.,
Freeport, Ill.
Beardsley & Piper Co., The,
2424 N. Cicero, Chicago 39, Ill.
Berkshire Mfg. Co., 1111 Power Ave., Cleveland 14, O.
Champion Foundry & Machine Co.,
1553 West Madison St.,
Chicago 7, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
LaGrange Park, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co.,
1553 West Madison St.,
Chicago 7, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
LaGrange Park, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINE MOUNTING PADS

Fabreeka Products, Inc.
222B Summer St., Boston, Mass.

MOLDING MACHINES (Rollover)

Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co.,
1553 West Madison St.,
Chicago 7, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
LaGrange Park, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINES (Squeeze)

Acme Aluminum Alloys Inc.,
232 North Findlay St.,
Dayton 3, Ohio.
Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div., Rockwell Mfg. Co., Freeport, Ill.
Champion Foundry & Machine Co.,
1553 West Madison St.,
Chicago 7, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Haynes Foundry Equipment Co.,
814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co.,
Union Bank Bldg.,
Pittsburgh 22, Pa.
International Molding Machine Co.,
LaGrange Park, Ill.
Johnston & Jennings Co.,
867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING SANDS

Foundries Materials Co.,
Coldwater, Mich.
Industrial Silica Corp.,
Stambaugh Bldg., Youngstown, O.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLD WASH

Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St.,
New York 17, N. Y.
United States Graphite Co.,
Saginaw, Mich.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS

American Monorail Co.,
13104 Athens Ave.,
Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co.,
Port Washington, Wis.

MOTOR CONTROL

Westinghouse Electric Corp.,
Pittsburgh 30, Pa.

MOTORS (Electric)

Allis-Chalmers Mfg. Co.,
Milwaukee 1, Wis.
Westinghouse Electric Corp.,
Pittsburgh 30, Pa.

MOUNTING PADS, MOLDING AND SHAKEOUT MACHINES

Fabreeka Products, Inc.,
22B Summer St., Boston, Mass.

NAILS (Chill)

Angell Nail & Chaplet Co.,
4580 E. 71st St., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Standard Horse Nail Corp.,
New Brighton, Pa.

NICKEL

International Nickel Co., Inc.,
67 Wall St., New York City 5.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St.,
Mishawaka, Ind.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
W. W. Sly Mfg. Co.,
4753 Train Ave., Cleveland 2, O.

OIL BURNERS

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Manufacturing Co.,
106 Tenth St., Brooklyn 15, N. Y.
North American Mfg. Co.,
4455 E. 71st St., Cleveland 4, O.
Stroman Furnace & Engineering Co.,
Div. of Peterson Oven Co.,
9900 Franklin Ave.,
Franklin Park, Ill.

OPEN HEARTH DOORS

W. M. Bailey Co.,
Pittsburgh 16, Pa.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co.,
1831 Columbus Rd.,
Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co.,
2450 West Hubbard,
Chicago 12, Ill.
Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc.,
5741 Russell St., Detroit 11, Mich.
W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co.,
Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

OXYGEN

Linde Air Products Co.,
30 E. 42nd St.,
New York 17, N. Y.

PARTING COMPOUNDS

Buckeye Products Co.,
7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co.,
Milwaukee 9, Wis.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

—When writing advertisers, please mention THE FOUNDRY—

PARTING COMPOUNDS (Cont'd.)

Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

American Lacquer Solvents Co., Phoenixville, Pa.

PATTERN COMPOUND

Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., Toledo 5, O.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

PATTERN PLASTER

United States Gypsum Co. 300 W. Adams St., Chicago, Ill.

PATTERN PLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

PATTERN PLATE STOCK

Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN SHOP EQUIPMENT

Buss Machine Works, 201 West 8th St., Holland, Mich.
Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Parks Woodworking Machine Co., 1546 Knowlton St., Cincinnati 23, Ohio.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Strand, N. A., Co., 5001 Wolcott Ave., Chicago 10, Ill.

PATTERN SUPPLY HOUSES

Freeman Supply Co., 1152 East Broadway, Toledo 5, Ohio.

PATTERNS

Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.

PATTERNS (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.

PATTERNS (Wood, Metal) (Cont'd.)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.

PERMANENT MOLD COATINGS

Acheson Colloids Corp., Port Huron, Mich.

PERMANENT MOLDS

Aimes Co., Inc., 2424 Euclid Ave., Cleveland, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.
General Eelectric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Globe Iron Co., Jackson, O.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Globe Iron Co., Jackson, O.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm., H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

Conover Engineering Co., 1740 East 12th St., Cleveland 14, Ohio
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Reichert Engineering Co., W. G., 1060 Broad St., Newark, New Jersey.

PLASTIC PATTERNS

Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

PLASTER OF PARIS

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 East 40th St., New York City 16.

PLATING TEMPERATURE CONTROLS

Foxboro Company, Foxboro, Mass.

PLUMBAGO

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dallet Co., 165 West Clearfield, Philadelphia, Pa.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill. Keith Bldg., Cleveland, Ohio.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm Inc., West Chester, Pa.

POLISHING MACHINERY

Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
Strand, N. A., Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

POURING DEVICES

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

POWDERED COAL EQUIPMENT

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

PRESSURE CASTING SEALER

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PROTECTIVE MATERIALS (X-Ray)

General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

PULLEYS (Magnetic)

Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

PUMPS

Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Quincy, Ill.

PUMPS (Dry, Vacuum)

Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PURIFIERS

Cleveland Flux Co., 1026 Main St Cleveland 13, O.

PUSH-OFF MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O

PYROMETERS

Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PYROMETERS (Immersion)

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

RADIUM

Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

RAMMERS

Independent Pneumatic Tool Co., Aurora, Ill.

RAPPING PLATES

Diamond Clamp & Flask Co., Richmond, Ind.

REFRACTORIES

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo

—When writing advertisers, please mention THE FOUNDRY—

REFACTORIES (Cont'd)

Eastern Clay Products, Inc., Jackson, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
National Crucible Co., Mermaid Lane and Queen Sts., Philadelphia 18, Pa.
Norton Co., Worcester 6, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
United States Graphite Co., Saginaw, Mich.

REPAIR PARTS (Molding Machine)

Pioneer Mfg. Co., West Allis, Wis.

RESPIRATORS

Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Wilson Products Inc., Reading, Pa.

RIDDLES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

RIDDLES (Electric)

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROD DIP

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

ROD STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

RUST PREVENTATIVES

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
C. Walker Jones Co., 6135 Lambert St., Philadelphia 38, Pa.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

SALT and SALT TABLETS

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

SAND (Core, Molding, Blasting)

American Silica Sand Co., Ottawa, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Oberlaender Sand Co., 2433 27th St. Moline, Ill.
Pangborn Corp., Hagerstown, Md.
Peerless Mineral Products Co., Conneaut, Ohio.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Producers Core Sand Corp., Michigan City, Ind.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SAND BLAST BARRELS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST CABINETS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SAND BLAST EQUIPMENT

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST NOZZLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Norton Company, Worcester 6, Mass.
Panborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Sly, W. W., Mfg. Co., 4753 Train Ave., Cleveland 2, O.

SAND BLAST ROOMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND BLAST TABLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

SAND CONDITIONERS

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

SAND CONTROL & TESTING EQUIPMENT

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT

American Air Filter Co., Louisville 8, Ky.
Ajax Flexible Coupling Co., Westfield, N. Y.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

SAND CONVEYING and HANDLING EQUIPMENT (Cont'd)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)

Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.
Fuller Company, Catasauqua, Pa.
Frank G. Hough Co., Libertyville, Ill.
Robins Conveyors Inc., 70 Pine St., New York 5, N. Y.

SAND COOLING SYSTEMS

Newaygo Engineering Co., Newaygo, Mich.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.

SANDERS (Pneumatic)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

SANDERS (Tapered-Spindles)

Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Ajax Flexible Coupling Co., Westfield, N. Y.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.

SAND PREPARATION EQUIPMENT (Cont'd.)

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo 21, N. Y.
Simplicity Engineering Co., Durand, Mich.

SAND RAMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

SAND RECLAIMERS

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 17, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SAND SIFTING and SCREENING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chciago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo 21, N. Y.
Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co., 601 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, O.

SANDING MACHINERY (Electric Portable)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

—When writing advertisers, please mention THE FOUNDRY—

SAWS (Band, Metal, Wood)

Atlantic Saw Mfg. Co., New Haven, Conn.
Do All Company, Des Plaines, Ill
Oliver Machinery Company, Grand Rapids 2, Mich.
Parks Woodworking Machine Co., 1546 Knowlton St., Cincinnati 23, Ohio.

SAWS (Cold Metal)

Bethlehem Steel Co., Bethlehem, Pa.
Do All Company, Des Plaines, Ill.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAWS (Electric Portable)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

SCALING HAMMERS

Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Independent Pneumatic Tool Co., Aurora, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm, Inc., West Chester, Pa.

SCRAP

Alter Company, 1702 Rockingham Rd., Davenport, Iowa.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
C. O. Barclett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Screen Equipment Co., Buffalo 21, N. Y.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Screen Equipment Co., Buffalo 21, N. Y.
Simplicity Engineering Co., Durand, Mich.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SEPARATORS (Abrasive)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Dollinger Corp., 36 Centre Park, Rochester 4, N. Y.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Dings Magnetic Mfg. Co., 4740 W. McGeough, Milwaukee 7, Wis.
National Engineering Co., 549 W. Washintgon St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHAKEOUT MACHINE MOUNTING PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

SHOCK ABSORBING PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

SHOVELS (Power)

Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.

SILICA FLOUR

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICOMANGANESE

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New Yorgk 17, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SLINGS (Chain)

Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SMELTERS & REFINERS

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5.
R. Lavin & Sons Inc., 3426 S. Kedzie Ave., Chicago 23, Ill.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SODA ASH

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.

SOLDER

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.

SPECIAL FOUNDRY ALLOYS

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STEEL (High Speed)

Bethlehem Steel Co., Bethlehem, Pa.

STEEL (Structural)

Alter Company, 1702 Rockingnam Rd., Davenport, Iowa.
American Bridge Co., Pittsburgh 19, Pa.

STRIPPING MACHINES

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS

Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

TESTING LABORATORIES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING MACHINERY

W. C. Dillon & Co. Inc., 5410 W. Harrison St., Chicago 44, Ill.

TESTING MACHINES (Tensile)

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

THERMOCOUPLES

Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)

Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5. N.Y.

TONGS

Industrial Equipment Co., Minster, O.

TOOLS, CUTTING (Carbide)

Severance Tool Industries Inc., Saginaw, Mich.

TOOLS (Electric Portable)

Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.

TOOLS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 8 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)

Linde Air Products Co., 30 E. 42nd St., New York 17.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

TOTE BOXES (see "BOXES-TOTE")

TRACTOR (Gas Powered)

Clark Industrial Truck Div. of Clark Clark Equipment Co., Battle Creek, Mich.

TRADE ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Gray Iron Foundres Society Inc., 1010 Public Square Bldg., Cleveland 13, Ohio.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1156 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)

Electric Storage Battery Co., Allegheny Ave. at 19th St., Philadelphia 3, Pa.

TRUCK CRANES

Hughes-Keenan Co., Mansfield, Ohio.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

TRUCKS (Power Lift)

Clark Industrial Truck Div. of Clark Clark Equipment Co., Battle Creek, Mich.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

TUMBLING BARRELS

Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS

Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.

UNLOADERS (Portable-Gas Electric)

Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

VALVES (Adjustable Orifice)

North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1563 West Madison St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Wm. H. Nichols Co., Richmond Hill, Long Island 18, N. Y.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATORS (Roof)

Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTILATING SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, Ohio.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTILATING SYSTEMS (Cont'd.)

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Landis Mfg. Co., 2305 Hilton Rd., Ferndale, Mich.

VIBRATION REDUCTION PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Cannon Vibrator Co., 111 Power Ave., Cleveland 14, Ohio.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Dallett Co., 165 West Clearfield, Philadelphia, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

WASH ROOM EQUIPMENT

Bradley Washfountain Co., Box 732, Milwaukee 1, Wis.

WATER COOLERS (Electric)

Ebco Mfg. Co., 401 W. Town St., Columbus 8, Ohio.

WAX (Core, Vent, Pattern)

United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WAX (Precision Casting)

Halowax Products Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

WEDGES (Foundry)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Lide Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Westinghouse Electric Corp., Pittsburgh 30, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Stratford, Conn.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BENDERS

Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WIRE BRUSHES

Independent Pneumatic Tool Co., Aurora, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WOODWORKING MACHINERY

Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.
Parks Woodworking Machine Co., 1546 Knowlton St., Cincinnati 23, Ohio.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
Westinghouse Electric Corp., Pittsburgh 30, Pa.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

ZINC

Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Help Wanted

FOUNDRY SUPERINTENDENT

Manufacturer of foundry supplies has opening for practical foundry man as technical advisor in the sales field.

Only men working at present in responsible positions need apply.

Reply kept strictly confidential.

Address reply stating age, education, experience and references to:

BOX 256

The FOUNDRY CLEVELAND 13, OHIO

FOUNDRY FOREMAN

First-class foundry foreman for jobbing foundry in middle west running gray iron and alloy iron castings, medium weight. Cupola and electric furnace. Must have wide molding experience and knowledge of gating and risering. Excellent opportunity for right man to advance to good position. Age 35 to 45 preferred. Address: Box 252, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

By old established malleable foundry in Eastern territory. Experienced in bench or floor machine molding. Good opportunity for man who can control scrap and costs. Address: Box 243, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY AND SALES EXPERIENCE

Young man with foundry and sales experience by small established malleable foundry located in the East. Good opportunity for right party. Replies confidential. Address: Box 208, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Must be capable, progressive and qualified to direct all foundry activities with practical knowledge and experience in producing light to medium gray iron castings. Must also be well versed in cupola operations and have ability to direct pattern methods and designs. Applicant not to be over middle-age with good personality and ability to handle men. Give full information concerning self, past experience and salary expected in first letter. Call or write—

WOOD BROTHERS INC.
1700 AURORA AVE. DES MOINES, IA.
TELEPHONE 6-1151

SALESMAN

Thoroughly experienced in sale of gray iron and semi steel castings, light to heavy, preferably with foundry experience and good contacts in Eastern Pennsylvania, New Jersey and vicinity. Good opportunity. State age, experience and salary wanted. Address: Box 253, The FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEERS

Newly developed industrial Engineering Department of a large leading industrial concern in Detroit, Michigan has openings for the following:

Assistant Chief Industrial Engineer

Methods Engineers

Time Study Engineers

Men with a college education are preferred and positions require experience in making detailed time studies, analysis of studies and job methods and the use of production standards for production and cost control. Excellent chance for advancement. Write giving information concerning background, age and references and state salary.

BOX 237

The FOUNDRY CLEVELAND 13, OHIO

GENERAL CORE ROOM FOREMAN

Thoroughly experienced man capable of taking complete charge of core room. In reply state experience and salary desired.

BOX 199

The FOUNDRY Cleveland 13, Ohio

GENERAL FOUNDRY FOREMAN

Experienced in production of cored castings. Capable of supervising all operations including cupola, sand slinger, squeezers and roll overs in gray iron foundry. Experience in production of boiler and radiator castings desirable. In reply state qualifications and salary desired.

BOX 200

The FOUNDRY Cleveland 13, Ohio

FOUNDRY SUPERINTENDENT and FOUNDRY FOREMAN

A-1 superintendent and foundry foreman. Must be experienced in all phases of foundry and cupola operations of the manufacture of grey iron castings. Excellent opportunity for right men. All applications confidential.

BOX 192

The FOUNDRY Cleveland 13, Ohio

WANTED

Steel Foundry Superintendent for electric steel foundry in Ohio, making 350 tons of small and medium size alloy and carbon steel castings per month, 99% machine production.
The right man can make himself a permanent position in a progressive Steel Foundry.
Good organizing ability and plenty of energy essential.

BOX 231

THE FOUNDRY CLEVELAND 13, OHIO

SALESMAN WANTED

Black Products Co., manufacturer of foundry facings has opening for technical service type salesman who is well grounded in foundry practice. He will cover either Illinois, Michigan, Ohio or Indiana territory. If record and experience indicates proper qualifications a personal interview will be arranged. Address: BLACK PRODUCTS CO., 13513 Calumet Ave., Chicago 27, Ill.

METALLURGIST

Metallurgist capable of operating induction ferrous furnace. Location middlewest. Address: Box 218, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly experienced in all operations of gray iron and semi steel jobbing foundry. Wide variety of work. Location Eastern Seaboard. Fine opportunity for right man. Write in confidence, stating age, experience and salary requirements. Address: Box 254, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For grey iron foundry employing 225 men—capacity 60 tons a day, medium heavy castings. Specialize in dry sand molding. Northwestern Pennsylvania. Give complete details of experience and salary expected. Address: Box 257, The FOUNDRY, Cleveland 13, Ohio.

CASTING SALESMAN

With metallurgical background to represent gray iron foundry producing quality castings for automotive, tractor, refrigerator and miscellaneous manufacturers. Write in detail experience, type of castings sold, territory covered and personal references. Address: Box 261, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS METALLURGIST

To assist in the supervision of a foundry and direct melting operations of special alloys. Chemical experience would be valuable. Advise experience, age and salary expected. Enclose snapshot. Location—Eastern Central. Address: Box 204, The FOUNDRY, Cleveland 13, Ohio.

PATTERN MAKER

Steel, for cast iron fixture plant. Must be first-class, good wages, steady, located in Eastern Ohio. Give full particulars. Address: Box 245, The FOUNDRY, Cleveland 13, Ohio.

CUPOLA TENDER

For grey iron foundry in New York State. This man must be thoroughly experienced in cupola operation. Please write giving age, experience and salary desired. Address: Box 231, The FOUNDRY, Cleveland 13, Ohio.

MELTING SUPERVISOR

Must have experience in operation of balanced blast cupolas and be fully qualified in handling men. Large gray iron foundry in Pennsylvania. Address: Box 233, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN

For small gray iron foundry in Eastern Pennsylvania, 25 employes. Must be experienced in overall foundry operations. Excellent opportunity. Reply in detail giving experience, age, marital status and salary desired. Address: Box 244, 16 E. 43rd St., New York 17, N. Y.

FOUNDRY SUPERINTENDENT

For old established malleable foundry in Eastern territory. Experienced in conveyor molding, proper gating and feeding essential. Knowledge of malleable metallurgy and duplex melting helpful. State experience and salary expected. Address: Box 242, The FOUNDRY, Cleveland 13, Ohio.

HEAD MELTER

Well established Eastern steel foundry has excellent opening for man in charge of acid electric furnace melting. In reply, state qualifications, experience and salary desired. Address: Box 236, The FOUNDRY, Cleveland 13, Ohio.

SUPERVISOR

Molding line production automotive foundry. Small community Middle West. Address: Box 228, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL MAN

For grey iron foundry in Southern Ohio. He must supervise fifty men and have thorough knowledge of molding, coremaking and cupola practice on medium and light work. Address: Box 232, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY SUPERINTENDENT

Plant located in East with capacity of 500 tons per month. Experienced in miscellaneous jobbing production of light and medium steel castings, also rigging for production quantities. Capable of taking charge of molding, coremaking and cleaning operations. Address: Box 195, The FOUNDRY, Cleveland 13, Ohio.

Manufacturer's Agents

SALES REPRESENTATIVE

Established nonferrous foundry desires sales representative for Western Pennsylvania. Will consider salary and expenses or commission basis. Address: Box 129, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVE

For Texas, Cleveland area and Southern California well introduced in foundry and die casting trade for a mid-western chemical manufacturing company. Address: Box 820, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES WANTED

Well established gray iron foundry specializing in match plate and cope and drag work desires a commission representative in each of the following areas: 1. New England states 2. New York State 3. Ohio, Indiana, Kentucky 4. Detroit, Michigan 5. Georgia, South Carolina, Alabama. Address: Box 197, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES

For Detroit, Chicago, Cleveland, Cincinnati, Pittsburgh areas. Established foundry compounds used by nonferrous and ferrous foundries. Address: Box 238, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Manufacturer's Agents

SALES REPRESENTATIVES
FOR
OHIO MAGNETS

Nationally advertised Ohio magnets are made for handling and separation of ferrous metals. Some select sales territories are still available to live representatives calling on foundries. Write today to:

THE OHIO ELECTRIC MFG. CO.
5910 MAURICE AVE.
CLEVELAND, OHIO

REPRESENTATIVES WANTED

Salesmen calling on foundries, smelters and refiners familiar with fluxes and their uses and applications to the various metals. Men with allied lines and already established preferred. Address: Box 235, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY FOREMAN

Desires connection with a progressive concern. 24 years' practical experience in all phases of grey iron to malleable operations in supervision of handling men and reducing scrap costs. Can handle job however large or small. References submitted upon request. Address: Box 998, The FOUNDRY, Cleveland 13, Ohio.

PATTERN FOREMAN

Capable in wood and metal pattern shop. Can take complete charge, estimate layout work, supervise men and train apprentice. Working foreman in small shop. Know foundry gates and can act as trouble shooter. Address: Box 259, The FOUNDRY.

FOUNDRY SUPERINTENDENT OR SUPERVISOR

Experienced foundryman, age 37 desires position with a good jobbing or production foundry. Know all phases of foundry operations to produce quality work in gray iron, semi steel or steel. Address: Box 258, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

20 years' foundry experience, 11 years' supervision, molding, coremaking, cupola, sand, cleaning, 4½ years' superintendent, jobbing and production, cost and quality minded. Age 44, married. Address: Box 209, The FOUNDRY, Cleveland 13, Ohio.

MR. MANAGER!

Do you require the services of a foundryman with 28 years experience? I desire a supervisory position in a production foundry. Many years' melting gray iron, malleable and steel in electric furnaces. Presently employed as superintendent of molding, core and melt. Employer knows of this ad. Will go anywhere. Good record and references. Address: Box 247, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Desires position as foreman or superintendent. Practical man. Twenty-two years' experience from molder to foreman gray iron or nonferrous, soil pipe and fittings. Prefer Western or Central New York. Address: Box 201, The FOUNDRY, Cleveland 13, Ohio.

MELT SUPERINTENDENT

Desires a position as melting superintendent or foreman of electric furnaces in a heavy tonnage foundry. Over 25 years' experience with carbon and alloy steels. (Both acid and basic process). Also several years' melting malleable and gray iron. Many years of this time on duplexing of iron and steel and bottom pouring. Familiar with highly mechanized shops. Now located in East but location is immaterial; domestic or foreign. Address: Box 248, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY ENGINEER

Graduate of Industrial University, Chile, South America. Speak English and Spanish. Married, 26 years of age. Two years' training Allis-Chalmers Mfg. Co. Interested in working either in U.S.A. or South America as design engineer, production control or time study engineer. Will be able to do a good job as sales engineer in South America for foundry equipment. Address: Box 226, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT OR FOREMAN

Grey iron-steel-brass-aluminum. 14 years' experience all types cores, core mixes and machines. Specialty core blower. Ability to set up and operate production core room efficiently. Employed. Desire Western location. Address: Box 240, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD FOUNDRY ENGINEER

TWENTY-FIVE YEARS' EXPERIENCE AIRCRAFT PARTS OR ANY INTRICATE WORK. FULL OR PART TIME. OHIO AREA OR METROPOLITAN NEW YORK LOCATION PREFERRED. ADDRESS: HAROLD C. HAASE, 557 SOUTH FOREST DRIVE, WEST ENGLEWOOD, NEW JERSEY.

GENERAL MANAGER

With long, valuable experience in managing, building up and maintaining foundry and machinery business on profitable basis, invites correspondence preliminary to interview. Ability to direct all office, sales, financial and production activities efficiently and economically unquestionably established by previous record. Address: Box 946, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT—MANAGER

38 years of age, 18 years' practical gray iron experience. Ten years as general foreman and foundry superintendent. Good references. Address: Box 138, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty-eight years' experience as foundry superintendent. Practical molder. Understand cupola thoroughly. Prefer position with foundry making high grade castings. At present employed. Address: Box 122, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

37 years of age—18 years' experience in jobbing and production foundries making pressure, cored and machine tool castings ranging from 2 lbs. to 20 tons. Industrial engineer by education, foundryman by experience. Wide experience in labor relations including contract negotiations. Held positions from melting foreman to the last 4 years as general manager. Excellent references. Address: Box 262, The FOUNDRY, Cleveland 13, Ohio.

PATTERNSHOP SUPERINTENDENT

20 years' experience with thorough knowledge for making wood and metal patterns and core blowing equipment for mechanized and semi-mechanized foundries. Age 38, married, available on short notice. Excellent references. Address: Box 264, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Thoroughly experienced in ferrous and nonferrous and in all phases of foundry operation. Light to heavy work. Green and dry sand. Practical on molding and coremaking. Thoroughly experienced in cupola control. Well versed in grey iron metallurgy and foundry costs. Thoroughly experienced in production and executive capacities. Sales, contact and expediting experience. Neat appearing and pleasing personality. Employed as superintendent. Address: Box 887, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly experienced in all branches of malleable and grey iron. Would like connection with progressive foundry. Now employed. Address: Box 246, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANAGER-SUPERINTENDENT

Engineering graduate with 20 years of operating experience desires permanent position. Capable of handling all details from estimate to finished grey iron castings. Familiar with core blowing, all kinds of high production and jobbing molding equipment, cupola operation and modern cleaning equipment. Can find the cause and correct losses. Successful in handling organization and labor relations. Address: Box 249, The FOUNDRY, Cleveland 13, Ohio.

Capacity Wanted

CAPACITY WANTED

Want brass foundry in the vicinity of Cleveland with open capacity to make production castings weighing ¼ lb. to 5 lbs. Address: Box 260, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

GRAY IRON CASTINGS

Open Capacity Available

Inquiries Solicited

TREDEGAR COMPANY

RICHMOND 11, VIRGINIA

OPEN CAPACITY

Wood or metal patterns
We also make masters, cast and finish up pressure cast match plates.

KEYSTONE PATTERN WORKS
315 2nd ST.
WILLIAMSPORT, PA.

OPEN CAPACITY

For sand cast aluminum castings. Address: REDDIG ALUMINUM FOUNDRY, 3417—9th ST., ROCK ISLAND, ILLINOIS.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Foundries For Sale

FOUNDRY FOR SALE

Memphis district. Will sell controlling interest or all. Reason for selling due to owners health. Good business here for one or two good foundrymen who are hustlers. If interested write for more information to: Box 251, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY

Small, well equipped foundry, squeezers, etc. Priced in line. Works in conjunction with machine shop.

CRAWLEY FOUNDRY & MACHINERY CO.
328 KETURAH STREET
NEWPORT, KENTUCKY

FOUNDRY FOR SALE

Nonferrous foundry in the Huntington, West Virginia area with all new, modern equipment. Can be handled for $5000.00 cash for immediate sale.

BOX 239
The FOUNDRY CLEVELAND 13, OHIO

Classified Advertising

Foundries for Sale

FOUNDRIES FOR SALE

GRAY IRON FOUNDRY—Very profitable medium size foundry. Well established business. Priced low as owner is retiring.

GRAY IRON FOUNDRY—Produces castings up to 5 tons. Good building and equipment. Price $90,000.

EDWARD H. ZOLL
Industrial Properties Throughout the East
790 Broad St. Newark 2, N. J.

FOUNDRY FOR SALE

Nonferrous foundry, San Francisco bay district, capacity large enough to employ 50 men. Address: Box 150, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry within 50 miles of Boston. Steady profitable business. Owner wishes to retire. Address: Box 241, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY

Three miles from Chicago's loop, 4300 square feet of floor space. 2 jolt squeezers, etc. $1500 full price. $60 per month rent. Address: Box 211, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

BRASS FOUNDRY AND MACHINE WORKS. One of the best housed and best equipped plants west of the Mississippi. Business established over 25 years. Owner to retire. New, modern, centrally located, brick building 100 x 125 ft. Included are the real estate, business, patents, copyrights, equipment and stock. All clear. Priced at $125,000. Terms. Further information upon request.

FOSTER & BARNARD INC.
ONE OF DENVER'S "WELL-KNOWN" REALTOR-INSUROR ORGANIZATIONS.
CHAMBER OF COMMERCE BUILDING
DENVER COLORADO

WORK WANTED

Bench and floor work. Small foundry making grey iron stove plate. Limited capacity available. Write or call—

FOUNDRY SERVICE, INC.
ANDERSON, INDIANA
MR. B. E. TERRELL
PH—33379

Wanted-To-Buy

WANTED

Grimes rollover—pattern draw machine. Please list the condition, age, size and price. ADDRESS: SLACK-HORNER BRASS MFG. CO., 1130 12th ST., DENVER 4, COLO.

WANTED

Electric furnace—Detroit type LFY—complete with transformer and automatic controls. Must be recent design and in good condition. Write full particulars including serial number, transformer characteristics and best cash price to: Box 250, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Blower or centrifugal type blower rated to deliver approximately 5000 C.F.M. at 24 oz. with or without motor or airweight control. Address: Box 230, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

DeWalt ME-2 foundry machine, used for the removal of gate, risers, etc.—large table and swinging arm, manufactured by DeWalt, Inc. of Lancaster, Pa. Address: Box 263, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Belt or motor driven two head planer, table 3' x 10', cross rail clearance above table 30" or 36"; also 24" shaper. Address: Sanitary Co. of America, Linfield, Pa.

WANTED TO BUY

Medium size Tabor abrasive cut-off machine. Must be in good condition. State model number, horsepower, voltage of motor and price. Address: WATERVLIET FOUNDRY CO., P.O. BOX 71, WATERVLIET, MICH.

Opportunities

90 PER CENT OF THE CUPOLAS MELT UP TO ONLY 50 TO 60 PER CENT

capacity per hour—although the best and hottest iron is produced only when cupola is operated to its capacity. Report on your cupola may prove an eye-opener—usually the savings are surprising. Every pound of steel used in cupola mixtures reduces cost and increases strength 20 to 60%, because steel is purer than the most expensive pig iron. Watch the scrap pile—statistics prove casting losses can be held between 1 to 5% depending on the line of work. Our system is not an expense—but a valuable investment. Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE.
MILWAUKEE, 12, WIS.

OPPORTUNITY

Inventor of arrangement of centrifugal casting machine and fast operating longitudinally-split permanent mold will assign half for expense of commercializing in foreign countries. Address: Box 255, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

We can furnish at any point stack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.

Employment Service

SALARIED POSITIONS

$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (38 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Employment Service

Foundry Manager—Grey Iron $12,0
Superintendent—Steel exp. ..... $ 7,5
Metallurgist—Stainless Steel ..... $ 7,2
2 Foremen—Grey Iron ..... $ 6,0
Write for application. Confidential. Established 33 years.

HARRISON PERSONNEL SERVICE
20 W. Jackson Blvd. Chicago

For Sale

FOR SALE

OVERHEAD ELECTRIC TRAVELING CRANES

Tons	Make	Span	Current
5	Northern	21'0"	230-VDC.
5	Northern	25'0"	230-VDC.
5	Milwaukee	50'0"	230-VDC.
10	Northern	37'10"	230-VDC.
5	Milwaukee	60'0"	220-VAC.
25	Alliance	55'0"	230-VDC.

ELECTRIC MONORAIL HOISTS

QU.	TONS	MAKE	CURRENT
7	½	Lo-Hed & Shepard	230-VDC.
1	1	Shaw-Box	220-VAC.
1	2	Shepard	230-VDC.
1**	2	Shepard	220-VAC.
1*	2	Shepard	230-VDC.
3*	3	Lo-Hed	230-VDC.
1*	5	Lo-Hed	220-VAC.

*—2-Motor, Fl. Op. **—2-Motor, Cg. Op.
ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED

SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE CRANE & MILL MOTORS, ELECTRIC BRAKE & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

1—International Draw Down Stripper, YPD, 30" x 72", Serial #43598.
4—Rollover & Jolting Machines (Osborn) air. Model 2047-1. Flask Space 22½ x 21½, 10" draw—.
1—Jeffrey Sanditioner, Serial #4764—0, 133523. with Allis Chalmers 2 HP Motor, 220/440/3/60/ motor
1—Lot of #150 Dixon Crucibles with 4" lip—$15.00 each
All types of Bucket, Belt, Apron, Chain and Booster Conveyor in stock.
Plus, Roller Conveyor in 10"-12"-14"-16"-18" and 24" wide in standard 8' and 10' lengths. With and Without Stands. Rollers above or below frame as desired.
2—Large Round Mills, 68" long, 32" in diameter
1—Demmler Core Blower, #1, Serial #888, Like New
1—Tabor Cantilever Jolt Squeeze, Table 17 x 20, #21513 Portable
1—O'Whiting Cupolette, 29" stack, lined to 18" with Blower & Motor
6—Globe Side Tilting Tumbling Barrels.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD ST.
SHILLINGTON, READING, PA.

FOR SALE

SLIGHTLY USED
1—Osborn #561-45 molding machine table 70 x 40
1—Osborn #561-55 molding machine table 70 x 40
2—International # N C clamp draw air turnover core machines 78" with 9½" draw.
2—Steel hoppers for use with above.
70—Perforated double steel core drier plates 70" x 40"
Can be inspected in operating position.

ALBION MALLEABLE IRON COMPANY
ALBION, MICHIGAN

FOR SALE

2 Model S; B & P Screenarators—rubber wheels
1 Gardner-Denver Air Compressor, new in 1945, size 6½ x 5½—Cap. Actual air 130 ft. at 125 lb. "V" belt drive—mounted on base with 30 H.P. Motor.
Send us your inquiries on any foundry equipment.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE.
CHICAGO 22, ILL. PHONE: CANAL 6-0314

Classified Advertising

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
3—75J Osborn Jolt Squeeze
2—SPO #611-B Stationary Oscillating Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
1—Tabor Plain Squeeze, Strain Rod Type
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table

BLOWERS FOR CUPOLAS AND FURNACES
6—#505 General Blowers, 5 HP, 3/60/220, 1400 CFM at 8-oz. pressure
Maxon-Premix Blowers for Gas, ½ to 1 H.P.

METAL MELTING EQUIPMENT
1—Recirculating Gas Fired Oven with all controls, suitable for Core Oven
2—Hausfeld 1000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
2—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
3—Stationary Gas Fired #60 Crucible Furnaces, with ¼ H.P. Maxon-Premix Blowers
2—Monarch-Rockwell Rotating, 500# Brass. Oil New 32" to 41" Dia. Shell Cupolas made to order.

TUMBLING MILLS AND SAND BLAST
1—Pangborn #2 Barrel, Suction Feed, Motor Drive, Complete
1—American Foundry Equipment Co. No. 1 Multi-table Wheelabrator with 12-8" dia. work tables. Complete unit.
2—Pangborn No. 2 GH direct pressure type sandblast barrels, motor driven. Complete units.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator and dust collector with motor. Suitable for use with room.

1—Mono-Rail System Complete with approximately 1200 ft. of track, 74—250# capacity 110 Volt hoists, two and four wheel trolleys, switches, 35—2000# 20 ft. bridges, and all necessary parts to install.

MISCELLANEOUS
4—Heavy duty flexible shaft grinders 2 HP
30—Jib Cranes, Floor Type, 1000 to 2000 lbs. capacity, 180° swing, 10 to 15 ft. arms
30—1000 lbs. Capacity Budget Electric Hoists
5—Low Lift Electric Trucks, 2000 lbs. capacity and up. Riding Operator Style
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T & L Pulley Drive
1—5 x 10' Simplicity Shakeout, complete with motor.
Miscellaneous Electrical and Gravity Conveyor Systems

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

65—800 lb drums of
DELTA GRAKOAT

3—500 lb. drums of
DELTA CHILLKOAT

This material is in good condition and can be inspected at any time at our plant. We are willing to accept any reasonable offer for this material f.o.b. our plant.

Direct inquiries to W. F. Pfeiffer, Purchasing Agent.

MACK MANUFACTURING CORP.
NEW BRUNSWICK, N. J.

FOR SALE

16,500# of 3/16" and 34,100# of ¼" Arcos 2M welding rod. Perfectly dry and in A-1 condition. Very desirable for welding all types of alloy steel and steel castings. Price 5c per lb. f.o.b. Bettendorf, Iowa. Address: Riverside Foundry, Bettendorf, Iowa.

For Sale

FOR SALE

90—Sets of used 12" x 14" to 18" x 24" Hines Pop-Off Flasks.
30—Sets of used 16" x 21" Shanafelt Flasks.
2—Osborn #42 Core Blowers.
2—Tabor Rollover Molding Machines.
1—Osborn #321 Jolt Squeeze Rollover Molding Machine.
1—Davenport #24-SA Rollover Molding Machine.
1—Osborn Rollover Core Machine.
7—Milwaukee #1439 Jolt Squeeze Molding Machines—Air Operated.
Note: All machines purchased new in 1944.

D. E. DONY MACHINERY CO.
47 LAURELTON ROAD
ROCHESTER 9, NEW YORK

FOR SALE
LATEST MODEL FOUNDRY EQUIPMENT
Sly Blast Mill—3½ Cu. Ft. Capacity
Complete Sand Handling System
Fisher—1000 lb. & 500 lb. Aluminum Tilting Furnaces
Vertical Core Ovens
Osborn & Tabor Molding Machines
Cupola Blower—15 H.P.
Beardsley & Piper Speedmuller
Automatic Electric Fork Lift Trucks & Tractors—3000 lb. cap.
We Invite Your Inquiries
BALCHER MACHINERY SALES
1884 S. COMPTON RD.
CLEVELAND HEIGHTS, OHIO
HENDERSON 1765

FOR SALE

1—18" x 25" Roots-Connersville positive pressure blower with 125 H.P. motor.
1—Motor operated Butterfly valve.
4—3 Ton Whiting steel converter shells with 2 tilting assemblies.
1—Champion 48" x 48" x 8" draw power flask push-off machines.
1—Osborn Jolt, rollover, draw molding machine.
5—Osborn Jolt strip molding machines.
2—Nichols Jolt, squeeze molding machine.
1—Nichols Jolt table.
2—Osborn Jolt, rollover squeeze molding machine.

GUNITE FOUNDRIES CORP.
ROCKFORD, ILL.

FOR SALE

2—Royer Sand Blenders
2—Osborne #602 Jolt Rollover Pattern Draw Molding Machines
2—Osborne #276 Jolt Squeezers
1—Gehnrich Continuous Core Oven
1—Osborne #243 Jolt Rollover Pattern Draw Molding Machine
2—Beardsley & Piper Screenerators
1—Jefferies Sanditioner
All equipment in excellent condition and priced for quick sale.

BOX 219
The FOUNDRY Cleveland 13, Ohio

FOR SALE

Large lot of tapered snap flasks. Most brand new. Will sell at fraction of original cost. Thousands of miscellaneous brands at fraction of original cost. Condition excellent. Address: ALBANY CASTINGS CO., INC., VOORHEESVILLE, N. Y.

FOR SALE

Simpson type "O" intensive muller type mixer complete with gear reduction less motor. Rotoclone benches for cleaning castings complete with motors and fluorescent lights. Pillar Cranes, shaw box type SSJ 4000#. Address: PLANT EQUIPMENT, CINCINNATI 14, OHIO.

FOR SALE

20—13" and 14" combination jolt squeeze strip molding machines, completely overhauled.

SUTTER PRODUCTS CO.
2005 WESTWOOD AVE. DEARBORN, MICH.

For Sale

FOR SALE

12' 4" x 16' 4" FOUNDROMATIC SHAKEOUT UNIT

(This is brand new!)

1—12' 4" x 16' 4" Foundromatic Shakeout unit consisting of:

4—6' x 8' Foundromatic Shakeouts having a rated capacity of 18.5 tons each to make up a 12' 4" x 16' 4" Shakeout deck of 74 ton capacity. Each unit to be equipped with #5 mechanism with 2" plate deck having a 2" x 4" opening. Complete with snubbers, support springs, spring guides, spring seats, but not including motor, starter, and pivoted motor base.

4—25 HP, totally enclosed ARZT, ball bearing, fan cooled, motors 60 cycle, 3 phase, 440 volt.

4—25 HP, 440 volt, across the line magnetic starters, NEMA #5 dust tight enclosures with separate dust tight stations.

4—Texrope Drives consisting of 5—C105 Belts and 4—9.2" PD deep groove motor sheave and 4—16" PD, deep groove shakeout sheaves cast integral with balance wheel for a total shaft speed of 1000 RPM operating at 33.5" centers.

4—Type S Rockwood pivoted motor bases for 25 HP motors.

SAND PREPARATION PLANT

Sand Preparation Plant manufactured by National Engineering Co., consisting of two 35 ton and one 25 ton sand bins located above two #3 Simpson mixers with enclosed gearing Flak speed reducers and a 40 HP, 1200 RPM, 440 volt, 3 phase, 60 cycle motor.

Mixers are arranged to dump onto a 20" x 67' conveyor belt which discharges onto a 20" x 28' incline conveyor belt carrying the sand in the sand buckets.

Sand is shaken out onto a floor grating which discharges onto a 30" x 72' style D. Union steel apron conveyor which discharges onto an incline 20" x 107' conveyor having a #1812 Stearns high duty magnetic pulley at the discharge end.

At this point the sand is discharged into a hexagonal screen 5'x3'x7' long perforated with ⅝ x 14" openings. The good sand is discharged into the boot of a 35' vertical elevator which has 52, 12" x 7' Style A malleable iron buckets.

The elevator discharges onto a 20"x110' conveyor which discharges into the two 35 ton and the one 25 ton bins.

All equipment is complete with motors and speed reducers, cyclone dust separator, exhaust fan and hoods and other equipment.

PANGBORN CASTING WASHER

One Pangborn Casting Washer, steel room—25' long x 25' wide x 17'-9" overall height constructed of ¼" plate and heavy structural steel frame. Has 15'x16' front door and ceiling door 16' x 18', one 12' diameter rotative table, 50 ton capacity.

One centrifugal pump, Type ML, 400# pressure and 300 GPM, driven by 150 HP, 3600 RPM 440 volt, 3 phase, 60 cycle motor.

OTHER MISCELLANEOUS FOUNDRY EQUIPMENT

MARION POWER SHOVEL COMPANY
Marion, Ohio

FOR SALE

No. 193-4 Milwaukee jolt, squeeze, strip moulding machine, new 1942.
No. 1N Simpson intensive mixer, new 1945.
MILES MACHINERY CO.
SAGINAW, MICH.

Classified Advertising

For Sale

FOR SALE

MOLDING MACHINES—

1—Tabor Split Pattern Jolt Squeeze Air Operated, Serial 20867.
1—Tabor Split Pattern Jolt Squeeze Air Operated, Serial 19097.
1—Tabor Split Pattern Jolt Squeeze Air Operated, Serial 19265.
1—Tabor Split Pattern Jolt Squeeze Air Operated, Serial 18458.
1—Tabor Jolt Squeeze, Yoke type, 13" x 18", Air Operated, Serial 27139.
1—Tabor Split Pattern Jolt Squeeze, 13" x 18", Air Operated, Serial 20363.
1—Osborn #42, portable, rollover, Air Operated, Serial 10377-D.
1—Osborn #42, portable, rollover, Serial 10377-B.
1—Tabor 10", Special Shockless Jar Squeezer, (end. brg. mch.) Serial 25086.
1—Tabor 10", Special Shockless Jar Squeezer, (end. brg. mch.) Serial 25085.

SAND HANDLING SYSTEM—

Link Belt Conveyor for sand distribution 18" x 105' with ten 21" x 7" plows, 10 steel hoppers 24" x 18" x 60" and plank walk 2' x 120'.
Motor for above 3 hp. G/E 1720/60/220/440, with chain drive to reducer unit.
Link Belt conveyor for shakeout 18" x 110'.
Motor for above 3 hp. G/E 1800/3/60/220-440 direct connected to reducer unit.
Link Belt Conveyor (crossover in pit) 18" x 7' cc.
Motor for above 1 hp. G/E 1130/3/60/220-440.
Link Belt Conveyor 18" x 12' cc.
Motor for above 2 hp. G/E 1740/3/60/220-440 direct connected to reducer.
Screen, Hopper Type, 3' x 8'.
Motor 3 hp. G/E 1720/3/60/220-440, V Belt Drive.
Elevator, Bucket Type, 12" x 35' rubber belt.
Motor for above 5 hp. G/E 1735/3/60/220-440 direct connected to reducer.
Link Belt Conveyor 18" x 25'—motor driven. F64.
Elevator, Bucket Type 12" canvas belt 34' cc.
Motor for above 5 hp. G/E 1800/3/60/220-440, chain drive.
Link Belt Areator, mill type 8'-6", 1x1'-6", wX36"h.
Motor for above 5 hp. G/E 1150/3/60/220-440, V Belt drive.
Sand Storage Bin 60 ton.
Jeffrey Areator with 7½ hp. motor.
Revolving Screen 4' diam. with gear reducer.

MISCELLANEOUS EQUIPMENT—

Simpson Sand Mixer #2 with 20 hp. motor.
Ball Mill, Marcy #32 with Wilfley concentrating table. #11-0 & 10 hp. motor.
2—Sprue Cutter, Tessmer ¾" sq. Model H, less motor.
Sprue Cutter, 14" throat "Benj. Middleton" with motor.
Monarch 300# Crucible Tilting Furnace, with mechanism, less motor.
10—Bohn Oil Fired Brass melting furnaces, pit type, for No. 80 crucible.
3—"Standard" Snagging Grinders, double end, 18" wheel.
2—Motors G/E 1/3 hp. 3/60/220.
3—Motors G/E ½ hp. 3/60/220.
1—Motor G/E 1/6 hp. 3/60/220.
Blower, G/E low pressure 32 oz. 1600 CFM with 20-24 hp. motor 3600/3/60/440.
Motor, 25 hp. 1200/3/60/220-440—need rewinding.
North American Blower, 160 oz. 275 CFM with 2 hp. motor G/E 3450/3/60/220-440.
"Spencer Turbo" Blower 16 oz. 250 CFM with 2 hp. motor G/E 3500/3/60/220-440.
Mathews Roller Conveyor 60' x 16" high roller 6" cx 2½" rolls, ball bearing with stand.
Mathews Roller Conveyor 210' x 16" low roller 6" cx 2½" rolls, ball bearing with stand.
286 Steel Squeezer Flasks 12" x 18" cope & drag.
463 Tabor flasks 12" x 18" cope & drag.

(Cont'd. top of next column)

For Sale

1 Snap Flask 10" x 20" cope & drag.
1 Snap Flask 14" x 19" cope & drag.
2 Snap Flasks 14" x 16" cope & drag.
1 Snap Flask 13¾" x 18¾" cope & drag.
1 Snap Flask 14" x 14" cope & drag.
1 Snap Flask 12" x 20" cope & drag.
1 Snap Flask 12" x 22" cope & drag.
500 Bottom Boards (wood) 12" x 18".
50 Bottom Boards (wood) 13¾" x 13¾".
50 Bottom Boards (wood) 11¾" x 21¾".
34 Squeezer Flask uplifts.
448 Flask weights.
3 pr. Crucible Tongs for No. 80 crucible.
3 Core Setting Tables (revolving).
4 Carrying Shanks for No. 80 crucible.
1 Time Meter G/E mod. 8KT 2a-26, 460v/60 cy.
1 Pump control-low water cutoff or alarm, "McDonald Miller" #152.

BOHN ALUMINUM & BRASS CORPORATION
Purchasing Department—Detroit, Michigan

SAND BLAST MACHINES

We have in stock three brand new complete portable sand blasting machines 100 pound, 350 pound and 650 pound capacity in sand. Can be used with steel grit also. New "Sanstorm" type, non-clogging design. Ideal for auto body shops, foundries, heat treaters, painters and forge shops. We also have in stock for immediate shipment a #22 Moline portable molding machine (brand new) also a used belt drive tilting tumbling barrel.

FEDERAL FOUNDRY SUPPLY COMPANY
1600 EAST 71st ST. CLEVELAND 5, OHIO

FOR SALE

1—9 ft. Clearfield mixer complete with 60 HP motor and starter. In good condition. Priced right for quick sale. Mixer can be seen in operation. ADDRESS: MONROE STEEL CASTINGS CO., MONROE, MICH.

FOR SALE

American skip bucket loader in excellent condition. Address: BERRETTINI ELECTRIC CO., 380 N. MAIN ST., PLAINS, PA.

FOR SALE
AND
IMMEDIATE SHIPMENT

1—No. 8 Sly centri-blast revolving table—Steel shot or grit blasting machine complete with motors and starters.
Used but in good operating condition. Price on request.

MASCOT STOVE CO.
CHATTANOOGA 2, TENN.

FOR SALE

New Simpson intensive mixer No. 2 never used. This mixer has water-cooled bottom, 42 inch crib, speed reducer, 20 horsepower motor and magnetic starter for 3-phase, 220 volt current. Address: NATIONAL BY-PRODUCTS, INC., ATTENTION F. E. JOYCE, BOX 615, DES MOINES, IOWA.

FOR SALE

Two foundry shakeouts, 3 x 5-foot Simplicity with TEFC motors (G.E.); good condition, slightly used; priced to sell. Address: P.O. Box 55, East Detroit, Mich.

FOR SALE

Patent No. 2,052,465 and wood and metal pattern equipment for producing water meter box covers. $1,500.00. Address: FRED E. HARDY, JR., 306 E. MAIN ST., SHELBYVILLE, ILLINOIS, PHONE 570.

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: The Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

FOR SALE

Small melting furnace for #20 or #30 crucibles, gas fired, 4-way burner and industrial vacuum cleaner motor-blower. Complete with tongs, shank and 3—#30 crucibles. Excellent for small nonferrous shop, school or laboratory. Price $200.00. Address: Colorado Precision Casting Co., 3201 W. 29th Ave., Denver 11, Colo.

For Sale

MOLDING MACHINES

18—No. 275-J Osborn Jolt Squeeze Molding Machines
3—No. 151 Osborn Drop Plate Stripper Molding Machines
1—12" x 16"—8" draw Type J International Jar Ramming Power Stripping Molding Machine
1—14" x 22" Type J.S. Jolt Stripping Molding Machine

TUMBLING BARRELS

2—36" x 60" Royersford Exhaust Type Chain Driven Horizontal Tumbling Barrels with 1" steel shell, C.I. bearing stands with worm gear reduction units complete with hand brake—5 H.P. 3 Phase 60 Cycle 220 Volt Fairbanks-Morse induction motors and Allen Bradley A.C. starters.

SIMPSON MIXER

1—Size 1½C Simpson Mixer with worm gear reduction unit complete with 10 H.P. 3 Phase 60 Cycle 220 Volt motor, bucket loader with hoist and dumping device equipped with speed reducer and 2 H.P. 3 Phase 60 Cycle 220 Volt motor and V belt drive Aerator with 2 H.P. 3 Phase 60 Cycle 220 Volt motor.

CENTRIFUGAL BLOWER

1—Ingersoll-Rand Direct Connected Electric Motor Driven Centrifugal Blower 8700 C.F.M. 1.25# per square inch pressure, 3500 R.P.M. complete with 75 H.P. 3 Phase 60 Cycle 220 Volt 40 Deg. C. Rise Ball Bearing, Squirrel Cage, Induction Type, Standard Open Motor, Manual Reduced Voltage Starter, Blast Gate Mechanism for Constant Air Weight Control assembled to 1-R Blast Gate and including two (2) Current Transformers and one (1) Air Weight Ammeter Calibrated in lbs. of Air per minute and also Amperes.

HARDWOOD SNAP FLASKS

Approximately 100 various sizes. Write for list and prices.
Above equipment may be inspected at our plant, and is offered subject to prior sale.

THE G. & C. FOUNDRY CO.
W. MONROE & OLDS STS.
SANDUSKY, OHIO

CUPOLA FOR SALE

No. 2 Whiting cupola complete with blower and motor. In excellent condition. Reasonable.

TRIANGLE FOUNDRY CO.
4533 WEST PATTERSON
CHICAGO 41, ILL.
PHONE: SPRING 7-4774

FOR SALE
PIPE

400 tons 30" bell and spigot pipe. Address: Box 229, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Cupola, 66" with 40 ft. stack. No controls or blower. Price $1,200; if loaded on car $1,400. Address: NATIONAL PLUMBING & FIXTURE CORP., ELLWOOD CITY, PA.

FOR SALE

TURBO BLOWERS
150 cfm @ 3 lb. Spencer with 5 HP 3600 RPM motor
PRESSURE BLOWERS
1400 cfm @ 8 oz. Robinson with 5 HP, 3/60, 3600 RPM motor
1100 cfm @ 16 oz. Sturtevant
450 cfm @ 6 lb. A & B with 30 HP motor
250 cfm @ 12 oz. GE with 2 HP motor
HOISTS
¼ Ton—Detroit Titan—440/3/60
¼ Ton—Budget—220/3/60
¼ Ton—Comet—440/3/60
¼ Ton—Shephard—220 D.C.
½ Ton—Chisholm Moore—440/3/60
½ Ton—Cleveland—440/3/60

THE MOTOR REPAIR & MFG. CO.
1522 HAMILTON AVENUE
CLEVELAND 14, OHIO

FOR SALE

One type LF Pangborn rotoblast with 8 foot table, complete with cloth screen dust collector and electrical equipment. Needs moderate repairs. Address: ELECTRIC MATERIALS CO., NORTH EAST, PA.

FOR SALE

Pittsburgh electric furnace transformer—600 KVA—60 cycle—3 phase—26400 primary. Address: ARNESON FOUNDRY, INC., 3303—66th ST., KENOSHA, WIS.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job*

No matter what you make —you're not making it at a profit !

YOU MAY HAVE the finest product of its kind. Your production set-up may be a miracle of efficiency. Perhaps you've even discovered how to cut your cost-per-unit below that of your closest competition. The fact remains —

You're still not *making* anything at a profit. Because actually, of course, there is no such thing.

Goods can only be *sold* at a profit. And selling them profitably requires the same kind of mechanization that keeps your production costs down.

In the *manufacture of a sale*, for example, there are five basic operations —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Any good salesman can handle all five. But no salesman should *have* to — not when the first three can be mechanized so economically through the use of advertising.

For good advertising, like the machine on your production line, is a multiplier of individual effort, enabling all of us to produce (and *earn*) far more than we could alone.

And when it goes to work in *business papers* — with their tremendous concentration of hand-picked prospects — advertising becomes the most efficient machine available for manufacturing sales at a profit!

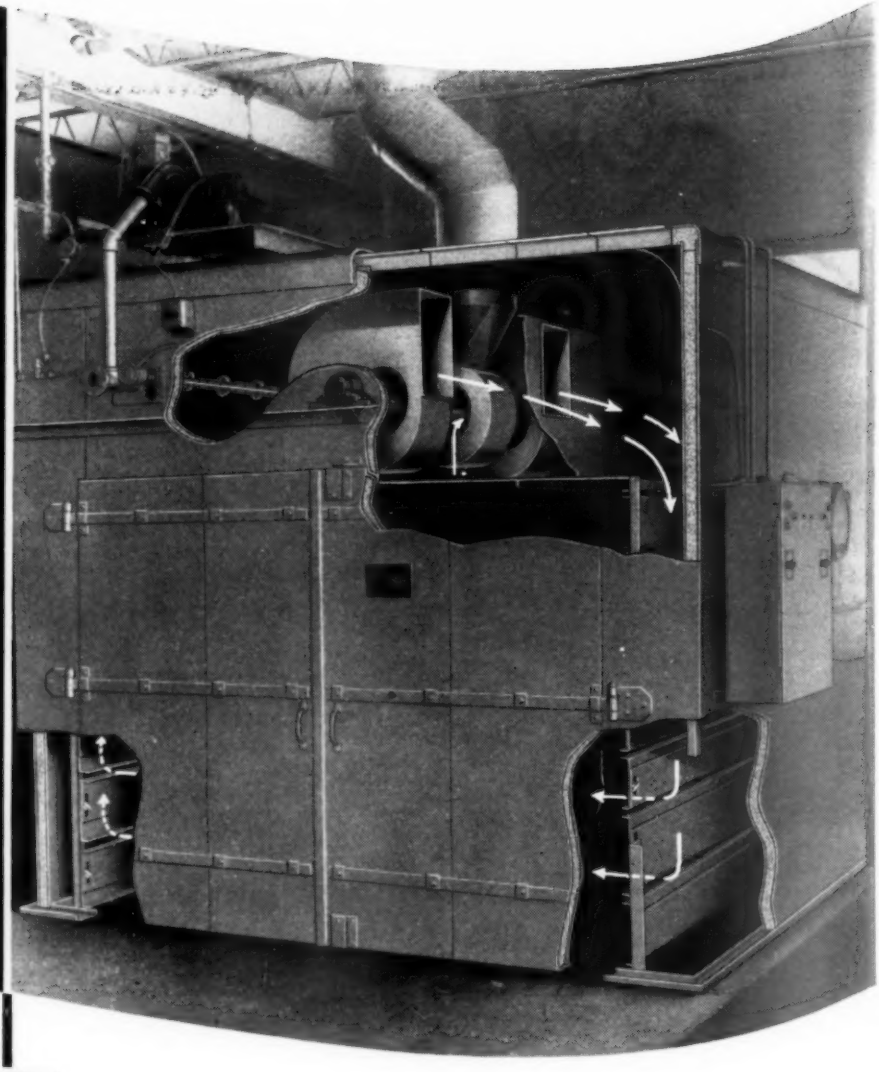
THE ASSOCIATED BUSINESS PAPERS ABP MEMBER

THE FOUNDRY—

is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

The Well Designed Industrial Oven

does a better job at less cost



This batch type oven used equally well for core, insulation, paint and grinding wheel baking—also low temperature heat treating, plastic curing and other processes, is a compact, self-contained unit. Recirculating heaters and exhaust fans are integral parts of the oven assembly for maximum heat conservation, greatest economy of plant space and better appearance. Note they are entirely within the oven frame.

Although gas heating is illustrated here, any other type of heating is equally applicable.

A single drive motor operates both recirculating and exhaust fans for maximum power saving.

A positive movement of heated air across the work space assures uniform baking temperatures throughout the entire load and maximum baking efficiency.

Field installation is greatly facilitated by the use of a completely wired operating control panel. All operating and control parts are readily accessible for inspection, service or adjustment

• • • •

Consult a Young Brothers Engineer before deciding on any industrial oven equipment.

5099

Young Brothers Co.

6500 MACK AVENUE • DETROIT 7, MICHIGAN

ADVERTISING INDEX

A

Accurate Match Plate Co. ... 34
Acheson Colloids Corp. ... 193
Acme Aluminum Alloys, Inc. ... 293
Acme Foundry Co. ... 286
Adams Co. ... 263
Aimes Co., Inc. ... 185
Ajax Electric Co., The ... 244, 245
Ajax Electric Furnace Corp. ... 244, 245
Ajax Electrothermic Corp. ... 244, 245
Ajax Engineering Corp. ... 244, 245
Ajax Metal Co. ... 244, 245
Allis-Chalmers Mfg. Co. ... 12, 13
Alloy Metal Abrasive Co. ... 273
Alter Co. ... 280
American Air Filter Co., Inc. ... 21
American Bridge Co. ... 278
American British Chemical Supplies, Inc. 294
American Lacquer Solvents Co. ... 285
American MonoRail Co., The ... 201
American Optical Co. ... 253
American Silica Sand Co. ... 197
American Wheelabrator & Equipment Corp. ... 59, 108, 109, 225
Angell Nail & Chaplet Co., The ... 281
Apex Smelting Co. ... 19
Arcade Mfg. Div., Rockwell Mfg. Co. ... 66
Asbury Graphite Mills, Inc. ... 250
Associated Business Papers, Inc. ... 315

B

Babcock & Wilcox Co., The (Refractories Div.) ... 119
Bailey, Wm. M., Co. ... 243
Baker Perkins, Inc. ... 143
Baroid Sales Div., National Lead Co. ... 274
Bartlett, C. O., & Snow Co., The ... 155
Bay State Abrasive Products Co. ... 111
Beardsley & Piper Co., The ... 179, 180, 181, 182, 183
Bell Aircraft Corp. ... 123
Bethlehem Steel Co. ... 1
Black, Sivalls & Bryson, Inc. ... 172
Blaw-Knox Div., of Blaw-Knox Co. ... 277
Bloomsbury Graphite Co. ... 279
Blystone Div., Standard Sand & Machine Co. ... 274
Brown Instrument Co., The, Div. of Minneapolis-Honeywell Regulator Co. ... 58
Buffalo Pattern Works ... 134
Buss Machine Works ... 285

C

Campbell, Frank D. ... 156
Campbell-Hausfeld Co., The ... 204
Carbon Limestone Co., The ... 290
Carborundum Co., The ... 20, 251, 319
Carl-Mayer Corp., The ... 237
Carman, Edwin Co., Inc. ... 292
Carpenter Bros., Inc. ... 260
Centrifugal Casting Machine Co. ... 284
Chain Belt Co. ... 22
Champion Foundry & Machine Co. ... 8, 9
Chicago Eye Shield Co. ... 258
Chicago Mfg. & Distributing Co. ... 10
Chicago Pneumatic Tool Co. ... 187
Chisholm-Moore Hoist Corp. ... 213
Clark Industrial Truck Div., of Clark Equipment Co. ... 194
Clayton-Sherman Abrasives Co. ... 277
Clearfield Machine Co. ... 221
Cleveland Chaplet & Mfg. Co. ... 289
Cleveland Electro Metals Co., The ... 256
Cleveland Flux Co., The ... Front Cover
Cleveland Formgrader Co., The ... 283
Cleveland Metal Abrasive Co., The ... 188
Cleveland Quarries Co., The ... 234
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. ... 207
Cleveland Vibrator Co., The ... 252
Climax Molybdenum Co. ... 262
Columbia Steel Co. ... 278
Columbus-McKinnon Chain Corp. ... 213
Corn Products Sales Co. ... 149
Crobaugh, Frank L., Co., The ... 290
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co. ... 43

D

Davenport Machine & Foundry Co. ... 212
Dayton Pneumatic Tool Co. ... 282
DeBardeleben Coal Corp. ... 296
Delta Oil Products Co. ... 26
Demmler, Wm., & Bros. ... 32, 280
Denver Fire Clay Co. ... 293
Despatch Oven Co. ... 223
Detroit Electric Furnace Div., Kuhlman Electric Co. ... 227
Detroit Testing Machine Co. ... 242
Diamond Clamp & Flask Co. ... 265
Dietert, Harry W., Co. ... 171
Dings Magnetic Separator Co. ... 264
Dougherty Lumber Co., The ... 224
Dravo Corp. ... 272

E

Eastern Clay Products, Inc. ... 169
Ebco Mfg. Co., The ... 260
Electric Furnace Co., The ... 294
Electro Metallurgical Sales Corp. ... 25
Electro Refractories & Alloys Corp. ... 31

F

Fabreeka Products Co., Inc. ... 189
Fanner Mfg. Co., The ... 144
Federal Foundry Supply Co., The 2, 214, 215
Federated Metals Div., American Smelting & Refining Co. ... 239
Fisher Furnace Div., Lindberg Engineering Co. ... 41
Ford Motor Co. ... 281
Foundry Equipment Co., The ... 44, 45
Foundry Services Inc. ... 294
Foundry Supplies Mfg. Co. ... 247
Foxboro Co., The ... 56
Fox Grinders, Inc. ... 292
Freeman Supply Co., The ... 160
Fremont Flask Co., The ... 233

G

Gardner-Denver Co. ... 46
General Electric X-Ray Corp. ... 152, 153
Giffels & Vallet, Inc. ... 139
Globe Iron Co. ... 283
Globe Steel Abrasive Co. ... 271
Gray Iron Founders' Society, Inc. ... 60
Great Western Mfg. Co. ... 196
Greene Electric Furnace Co. ... 296

H

Harnishfeger Corp. ... 52
Hauck Mfg. Co. ... 296
Hercules Powder Co. ... 49
Herman Pneumatic Machine Co. ... 165
Hewitt-Robins, Inc. ... 107
Hickman, Williams & Co. ... 220
Hines Flask Co., The ... 36, 37
Hough, Frank G., Co., The ... 47
Houghton, E. F., & Co. ... 61
Hughes-Keenan Corp. ... 268
Humphrey, C. S., Co. ... 24
Hydro-Blast Corp. ... 255

I

Illinois Testing Laboratories, Inc. ... 127
Imperial Belting Co. ... 258
Industrial Equipment Co. ... 276
Industrial Pattern Works ... 241
Ingersoll-Rand ... 240
International Graphite & Electrode Corp. 62
International Molding Machine Co. ... 191
International Nickel Co., Inc., The 101, 271
Ironton Fire Brick Co., The ... 63

J

Jackson Iron & Steel Co., The ... 278
Jeffrey Mfg. Co., The ... 211
Johns-Manville ... 238
Johnston Mfg. Co. ... 266
Joy Mfg. Co., Sullivan Div. ... 141

Continued on page 318

ADVERTISING INDEX

K

Kirk & Blum Mfg. Co., The 203
Krause, Chas. A., Milling Co. 117

L

Lanly Co., The 261
Lavin, R., & Sons, Inc. 150
Lindberg Engineering Co. 41
Linde Air Products Co., The 57
Link-Belt Co. ..... Back Cover

M

Markal Co. 266
Master Pattern Co. 205
Master Pneumatic Tool Co., Inc., The .. 278
Mathews Conveyer Co. 121
Mathieson Chemical Corp. Inside Front Cover
Metal Blast, Inc. 159
Milwaukee Chaplet & Mfg. Co. 230
Milwaukee Foundry Equipment Co. 53, 167
Mine Safety Appliances Co. 275
Modern Equipment Co. 320
Moline Iron Works 291
Moulders' Friend The 176
Murphy, Jas. A., & Co. 272, 280
Murray, D. J., Mfg. Co. 294

N

National Carbon Co., Inc. 129
National Engineering Co. 28, 29
Neff & Fry Co., The 276
Newcomb-Detroit Co. 184
New Haven Vibrator Co. 285
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc. 226
Nicholls, Wm. H., Co., Inc. 30
North American Mfg. Co., The 42
Norton Co. 195

O

Oberlaender Sand Co. 292
Ohio Electric Mfg. Co., The 232
Ohio Ferro-Alloys Corp. 48
Oliver Machinery Co. 274
Orton Crane & Shovel Co. 14
Osborn Mfg. Co., The 146, 147
Ovingsteel Inc. 296

P

Palmer-Bee Co. 162, 163
Pangborn Corp. 6, 7, 40
Parsons Engineering Corp. 296
Peninsular Grinding Wheel Co. 16, 17
Penn Iron Works 282
Pennsylvania Foundry Supply & Sand Co. 273
Pfaff, George, Inc. 256
Pioneer Mfg. Co. 267
Pittsburgh Crushed Steel Co. 282
Pittsburgh Lectromelt Furnace Corp. 206
Pittsburgh Metals Purifying Co. 284
Plaster Process Castings Co. 289
Plastic Corp. of Chicago 270
Pressed Steel Co., The 15
Producers Core Sand Corp. 296
Putnam, A. H., Co. 296
Pyrometer Instrument Co., The 293

R

Radium Chemical Co., Inc. 283
Ransohoff, N., Inc. 290
Raybestos-Manhattan, Inc., Manhattan Rubber Div. 190
Redford Iron & Equipment Co. 133
Republic Coal & Coke Co. 290
Rietz Lumber Co. 252
Robbins & Myers, Inc. 202
Robins Conveyors Div., Hewitt-Robins, Inc. 107
Robinson Clay Products Co., The 249
Roots-Connersville Blower Corp. 186
Rossborough Supply Co. 257
Rotor Tool Co., The 27, 281
Roura Iron Works, Inc. 272
Royer Foundry & Machine Co. 124
Ruemelin Mfg. Co. 284

S

Schneible, Claude B., Co. 114
Schramm, Inc. 208
Scientific Cast Products Corp., The 262
Screen Equipment Co., Inc. 198
Severance Tool Industries, Inc. 294
Shanafelt Mfg. Co., The 175
Shepard Niles Crane & Hoist Corp. 210
Silverstein & Pinsof Inc. 259
Simonds Abrasive Co. 54
Skilsaw, Inc. 131
Sly, W. W., Mfg. Co., The 113
Smillie, C. M., & Co. 292
Smith Facing & Supply Co., The 267
Smith Oil & Refining Co. 229
Smith, Werner G., Co., The 4, 5
Smooth-On Mfg. Co., ... 291
Sonken-Galamba Corp. 246
Spencer Turbine Co., The 216
SPO, Inc. 209
Standard Conveyor Co. 222
Standard Horse Nail Corp. 250
Standard Silica Corp. 294
Stearns Magnetic Mfg. Co. 236
Steel Shot & Grit Co. 282
Sterling Grinding Wheel Div., of the Cleveland Quarries Co. 199
Sterling Wheelbarrow Co. 18, 268
Stevens, Frederic B., Inc. Inside Back Cover
Stratton Mfg. Co. 286
Stroman Furnace & Engineering Co. 35
Superior Flake Graphite Co. 192
Surface Combustion Corp. 292
Syntron Co. 264

T

Tabor Mfg. Co., The 55
Tamms Silica Co. 289
Thiem Products, Inc. 50, 51
Toledo Matchplate Co. 289
Truscon Steel Co. 279

U

Union Carbide & Carbon Corp. 25, 27, 129, 275
United Compound Co. 296
United Oil Mfg. Co. 11
United States Graphite Co., The 217
United States Rubber Co. 103
United States Steel Corp., Subsidiaries 278
United States Steel Export Co. 278
Universal Engineering Co. 231
U. S. Industrial Chemicals, Inc. 294
U. S. Reduction Co. 33

V

Vanadium Corp. of America 137
Velsicol Corp. 177
Vonnegut Moulder Corp 291

W

Wedron Silica Co. 269
Wellman Bronze & Aluminum Co. 276
Wellman Engineering Co., The 294
Westinghouse Electric Corp. 64, 65
Westover Engineers 269
Wheland Co., The 235
Whiting Corp. 23, 38, 39
Woodward Iron Co. 105

Y

Young Brothers, Co. 316

Table of Contents 3

Classified advertisers, Pages 310, 311, 312, 313, 314

Fluidity Spiral of white iron made by the duplex cupola-air furnace process utilizing FERROCARBO briquettes. Notice the unusual length of this spiral and the even fracture of the gate.

FERROCARBO briquettes are proving particularly effective in producing consistently prolonged metal fluidity. A number of fluidity spirals of white iron made by the duplex cupola-air furnace process, with FERROCARBO briquettes in the charge, confirm this fact. The one that is illustrated is a typical example.

Plant records, showing a substantial reduction in misruns, shrinks and hot tears, add further proof that hotter, more fluid iron is being produced with FERROCARBO briquettes in the charge.

Other advantages are also provided by this new development in duplex malleable iron melting. For a more thorough and detailed understanding, we suggest a discussion with our metallurgical staff at your earliest convenience.

FERROCARBO Briquettes
BY CARBORUNDUM
TRADE MARK

THE CARBORUNDUM COMPANY, Abrasive Grain and FERROCARBO Division, Niagara Falls, New York

FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland, Birmingham, Philadelphia and Buffalo; Miller and Company, Chicago, St. Louis and Cincinnati

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

Another FIRST in MODERN Cupola Chargers . . . . . .

MODERN EQUIPMENT CO. *Presents*

The NEW SQUARE-TOP CONE-TYPE SIDE-DISCHARGE Cupola Charging BUCKET

This newly developed bucket . . . proven in actual foundry operation . . . is especially recommended for the large diameter cupolas. A *loose center, compact sides* and an *even charge in the stack* are the result of the newly designed *small center cone* and the *large side-discharge doors.* The air penetrates to the center of the stack, a condition which produces higher melting rates.

For further information on the new Square-Top, Cone-Type, Side-Discharge Bucket ask the Modern Representative in your territory, or write—

PATENTS APPLIED FOR

MODERN EQUIPMENT CO.

FORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES.

"Operation Unlimited"

LINK-BELT Overhead Conveyors for foundry mass production

ings being handled through ing cycles to cleaning rooms rue being dumped automat- y at discharge station and fin- l cores being transported to dry operations.

he possibilities of Link-Belt head conveyors in expediting production, cutting costs and ng the foundry a better place labor, are unlimited. Floor e is made available for pro- ion because trolley conveyors upported from overhead and double use of ceiling or roof trusses. They can travel irregular paths at predetermined speeds to meet production requirements. They are simple, rugged, inexpensive and easily installed around existing equipment. Path readily altered. Require little power to operate with practically no maintenance.

Let our experienced foundry engineers help you in applying trolley conveyor systems; also sand preparation and sand, mold, core and castings handling units to meet your requirements.

Top picture: Castings from shakeout stations handled in perforated buckets suspended from trolley conveyor. Above, right: cooling tower with overhead conveyor handling individual castings. Below: pictures left to right show overhead trolley conveyors handling and automatically discharging sprue in charge make-up area, mold conveyor and core transport and storage conveyor, respectively.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

11,202

THE SYMBOL OF QUALITY LB LINK-BELT

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

Stevens TRI-COTE

"The Ceramic Principle In Core and Mold Coatings"

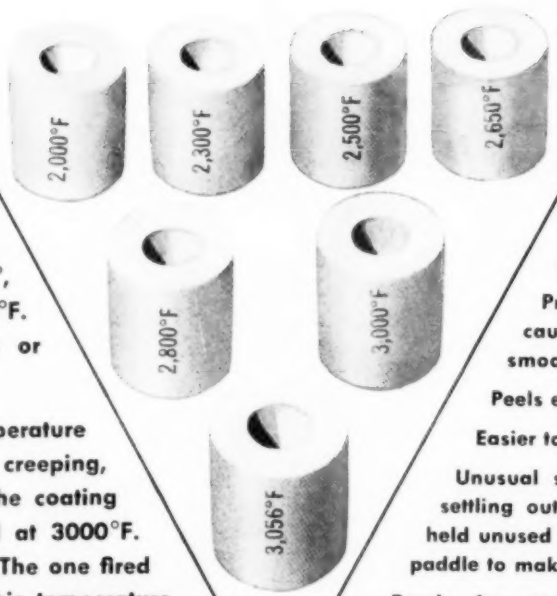
ELIMINATES THE NEED OF SEVERAL CORE COATINGS

Fired at High Temperatures

The illustration at right shows 7 cylinders made of Stevens Tri-Cote. They measure 1½" diameter, 1⅝" high, with a ¾" hole through the center.

Each was fired in an electric furnace, being held at test temperature for two hours. Those fired at 2000°, 2300°, 2500°, 2650°, and 2800°F. showed no expansion, contraction or distortion.

This proves that up to some temperature above 2800°F. there would be no creeping, cracking, spalling or flaking off of the coating on core or mold. The cylinder fired at 3000°F. showed the start of incipient fusion. The one fired at 3056°F. had zero porosity, so, this temperature was termed final fusion, although the cylinder held its shape after the two hour firing.



Check These Outstanding Features

Can be applied by dipping, spraying or brushing on any size core for casting steel, gray or malleable iron, brass, bronze or aluminum. There is no need for several core coatings for different applications.

Seals the sand surface against metal penetration.

Produces smooth, clean casting surface because it fills spaces between sand grains smoothly, completely.

Peels easily and cleanly from all metal surfaces.

Easier to mix with water.

Unusual suspension. No agitation required since settling out is extremely slow. A tank of solution held unused several days needs but a few turns of a paddle to make it ready for use.

Ready for use immediately after mixing. It is not necessary to hold the solution as its Baume will not change.

FREDERIC B. STEVENS INCORPORAT

DETROIT 16, MICHIGAN

- NEW ENGLAND . . 166-182 Brewery St., New Haven, Conn.
- NEW YORK and PENNSYLVANIA . . 93 Stone St., Buffalo, N. Y.
- INDIANA . Hoosier Supply Co., 36 Shelby St., Indianapolis, Ind.
- CANADA . FREDERIC B. STEVENS OF CANADA, LIM
- 1262 McDougall St. . . . . Windsor, O
- 41 Dover Court . . . . . Toronto, O